A GEOMETRICALL EXTRACTION,

OR, A

Compendious *Collection* of the *Chiefeſt* and *Choiſeſt* PROBLEMES, Selected out of the beſt and lateſt Writers.

Whereunto are added above Thirty

PROBLEMES

OF THE

Authors own Invention, being performed by a better and briefer way than hitherto hath been made known.

By JOHN SPEIDELL, *late Practitioner in the Mathematicks, and Profeſſor thereof in* London.

The Second Edition, Corrected and Enlarged.

LONDON,
Printed by *T. M.* for *Thomas Davies*, and are to be ſold at his ſhop in St. *Pauls* Church-yard, at the ſigne of the Bible, neer the little North doore, 1657.

Sr. Richard Newdigate of
Arbury in the County of Warwick
Baronet 1709

To the Honourable Knight

Sir IOHN EGERTON,

Heire apparent to the Right Honourable Thomas Lord Ellesmore, Lord high Chancellor of ENGLAND.

SIR,

I should not so boldly adventure, to shrowd this weak work of mine under your worthy Patronage, were I not assured, that as in your judgment you are able to discern, so in your noble disposition, you will favourably accept these first fruits of mine. In which kinde it hath pleased you sometime to have had conference with me, having to your bountifull rewards been pleased to adde a plentifull report of your good opinion had and held of me. Concerning the work it self, though

though it be little, yet I hope it will appear both for the matter and manner, greater in value then in volume, containing of the chiefest things, partly collected out of others, and partly of my own, and performed by a more speedy way then by any former Writer. Infine, whatsoever the Book is or shall be, I esteem it too little, to expresse my thankfull minde for your many favours, wherein I shall ever be studious to supply my other wants, by my best endeavours, and ever rest, At

Your honourable disposition

Io: Speidell.

To the Reader.

Courteous Reader, Having for these ten years space, been a professer of the Mathematicks in this City, during which time, I have instructed many Gentlemen and others (in Arithmetick, Geometry, Astronomy, and also, have perused all the best Authors, that I could get, in Latine, Italian, French, English, high Dutch, and Flemish, and not having found this part which I here present to thy view (consisting of the best, choise, and most artificial Problemes) so amplie, and after so breife a way performed by any: it hath made me therefore the more bold to present it before thee, wherein I have indeavoured to be brief, knowing that much superfluitie of words doth more let and hinder, then any way further, or advance, the matter, yet not so brief, as thereby to obscure or darken the work in any kinde, but to make it the more cleere, easie, and plain to the reader, and for the better satisfaction of such as desire the demonstration of every thing. I have coated in the margent such places of Euclide as tend thereunto, and for a further light, have in the most principal places set Arithmeticall numbers by the Diagrams, whereby such as are desirous to make triall that way, may finde satisfaction. And not only these Problems contained in this book (wellbeloved Reader) but much more viz. in Arithmetick, Geometrie, Astronomie, Navigation, Surveighing, fortification, architecture, taking of heigths & distances, & all other parts of the Mathematicks, &c. may be performed by a Mathematicall

To the Reader.

[illegible] *present year) by me invented, [illegible] made in Anno 1607. the which with all other Mathematical instruments, are made by my loving freinds* M. Elias Allen, *over against* St. Clements *Church in the Strand, in* Brasse; *and* Mr. John Tomson *in Hosier lane by Smithfeild (in Wood) and may also both in Wood and Brasse be had, with the instructions thereof by me at my house: Thus desiring thee friendly Reader to peruse this work with judgment, and not rashly to speak evill of him that hath not harmed thee, but taken much labour and pains day and night to compose, collect, and peruse this work for thy good: so shalt thou walk charitably, and give me occasion to deserve thy further love, in setting forth a second parte. The which I promise to perform God willing, as I shall perceive this to be respected, and so for this time I rest, remaining,*

Thy loving freind,

I. Sp.

A GEOMETRICALL EXTRACTION

Teaching the construction of diuers of the moſt choiſe and chiefe Probleames.

Verie profitable, & in performance moſt pleaſant and delightfull.

PROBLEME I.

To deuide a line giuen into two equall parts at right angles.

Let A B. be a line giuen to be ſo deuided.

FIrſt ſet one foot in the end A. and opening the other foot at pleaſure to aboue halfe the line AB. make the arches C & D. aboue and below, then with the ſame diſtance ſetting one foot in the other end B. croſſe thoſe arches in E. and F. Laſtly drawe the 10. 1.

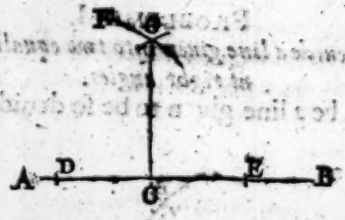
 line

line E F, which shall deuide the line A B, into two equall parts in G, as was required.

PROB. II.

Vppon a point in a line giuen, to erect a perpendicular.

Let A B be a line giuen, and let C, be a point assigned therein, whereuppon it is required, to erect a perpendicular.



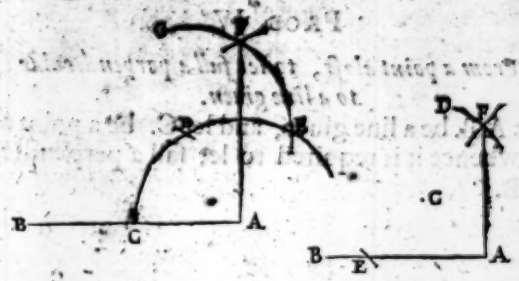
FIrst set one foot in the point C, and open the other foot to almost the neerest end A, and make the points D and E, on each side the point C, that done set one foot in D, and open the other foot at pleasure to some wyder distance, and make ouer head the arch F. Then with the same distance setting one foot in E, crosse the said arch in G. Lastly, drawe the line G.C. which shall be a perpendicular to A.B. vppon the point C, required. 11.1.

PROB. III.

To erect a perpendicular vppon the end of a line.

Let A.B, be a line giuen, and let it be required to erect a perpendicular vppon the end A.

Se-



SEt one foot in the end A. and opening your Compasses at pleasure, make the arch C D E. Then with the same distance setting one foot in C. crosse that arch in D. that done, keep one foot in D. and make with the other, the arch E G. then set one foot in E. and with the same distance crosse the said arch E G. in F. Lastly drawe the line F A. which shall be a perpendicular vpon the end A. of the line A B. which was required.

Another way.

AGaine, let in the last *Diagram* on the right hand A B. be a line giuen, and it is required vppon the end A. thereof, to erect a perpendicular.

Set one foot in the end A. and with the other take a point at pleasure as C. then keeping one foot in C. make aloft the arch D. and crosse also the line *A* B. in E. that done, lay your Rular by the points E C. and where it crosseth the arch D. set F. Lastly drawe the line F A. which shall be a perpendicular to A B. vpon the end A. as was required. 31.3.

Prob. IV.

From a point aloft, to let fall a perpendicular to a line giuen.

Let A B. be a line giuen, and let C. be a point aloft, from whence it is required to let fall a perpendicular to A B.

Set one foot in C. and opening the other foot almoſt to the neereſt end A. make in the line A B, the markes D. and E. Then ſet one foot in E. and with the ſame diſtance make vnderneath the arch F. ſet alſo one foot in D. and croſſe the ſide arch F. in G. 12. 1. Laſtly, lay your Rular by the points C. G. and drawe the line C H. which ſhall be a perpendicular to A B. from the point C. according to your deſire.

Another way.

AGaine, in the laſt *Diagram*, on the right hand, Let A B. be a line given, & let C. be a point aloft, from whence it is required to let fall a perpendicular to A B.

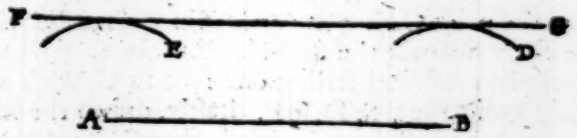
Laye

Laye the Rular by the point C. and any part of the line A B. as D. and drawe the line C D. which deuide into two equall parts in E. then keeping one foot in E. with the distance EC. make the arch C G F. to cut A B. in F. Lastly, drawe the line C F. which performeth the demaund. 31. 3.

PROB. V.

To drawe a Parralell to a line giuen.

Let A B. be a line giuen, whereunto it is required to drawe a Parralell.

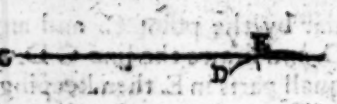


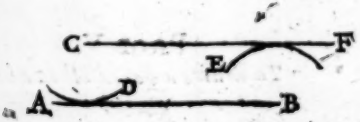
SEt one foot in the end A. & opening the other foot at pleasure, make ouer head the arch E. Then with the same distance, Setting one foot in the other end B. make the arch D. Lastly, lay your Rular by the tippes of those arches, and drawe the line F G. which shall be a parralell to A B. as was required.

PROB. VI.

To drawe a Parralell to a line giuen from a point assigned.

Let A B. be a line giuen, and let C. be a point assigned, from whence a parralell is to be drawne to A. B.





SEt one foot in the end A. and extend the other ~~to the point C then set one foot in B. & make~~ with the same distance the arch D. That done, take the whole line A B. and setting one foot in C. with the other crosse the arch D. in E. Lastly, drawe the line C E. which shall be a parralell from C. to A B. as was required.

31.1.

Another way.

AGaine, in the former *Diagram* belowe, let A B. be a line giuen, & C. a point assigned, from whence it is required to drawe a parralell to A B.

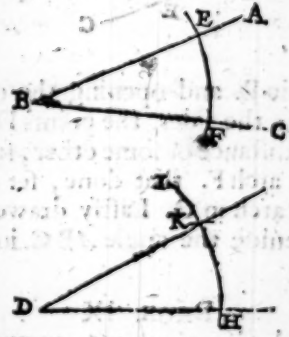
Set one foot in C. and takeing the shortest distance to A B make the arch D to touch the line A B. Then with the same distance setting one foote in the end B. with the other make the arch E. That done, lay your Rular by the point C. and the tippe of the arch E. and drawe the line C F. which shall be a parralell to A B. as was required.

PROV.

PROB. VII.

To make an angle, Equall to an angle giuen.

Let *A* B C. be an angle giuen. And it is required to make another angle equall thereunto.



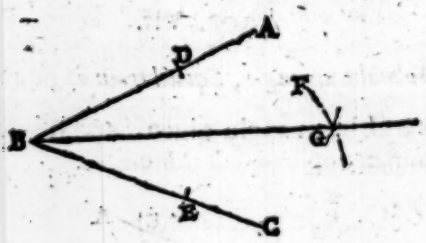
FIrſt drawe any where a line as D H. Then ſetting one foot in the angle B. open the other, to almoſt the end *A*. or the end C. and make the arch E F. Alſo ſet one foot in the end D. (of the line D H.) and with the ſame diſtance make the arch H I. That done, take the diſtance F E. and ſetting one foot in H. croſſe the arch H I. in K. Laſtly draw the line D K. which ſhall include the angle K D H. equall to the angle A B C. required. 23. 1.

PROB. VIII.

To deuide an Angle giuen into two equall parts.

Let *A* B C. be an angle giuen, to be deuided into two equall parts.

Set one



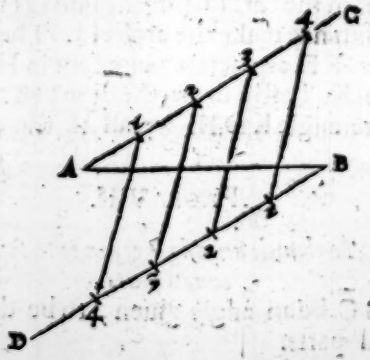
SEt one foot in B. and opening the other at pleasure, make in the sides, the points D. and E. Then with the same distance or some other, setting one foot in E. make the arch F. that done, set one foot in D. and crosse that arch in G. Lastly drawe the line B G. which shall deuide the angle *A* B C. into two equall parts required.

9. 1.

PROB. IX

To deuide a line giuen into any number of equall parts required.

Let A B, bee a Line giuen, to bee deuided into fiue equall parts.



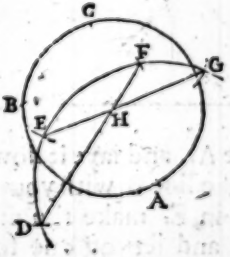
First

First from the end A. drawe a line at pleasure, making with the giuen line A B. any kinde of angle, as the angle B A C. Then by the seauenth Propolition make the angle D B A. equall thereunto by drawing the line B D. That done, set from A. towards C. foure equall spaces at pleasure, (alwayes one lesse then the number whereinto the line giuen is to be deuided) Likewise begining at B. set vppon the line B D. the same foure equall spaces from B. towards D. as you see on both sides, numbred by 1.2.3.4. Lastly, drawe crosse lines from one point to the other, to cut the line A B. so shall you deuide it into fiue equall parts required. 9. 6.

Prob. X.

To bring three points not lying in a straight line, into one circumference.

Let A B C. be three points giuen, to be brought into one Circumference.



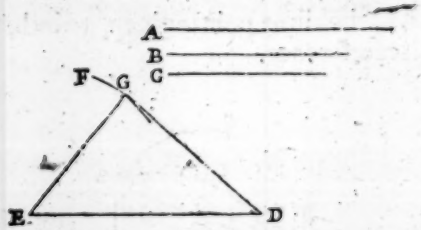
SEt one foot in A. and opening your Compasses to aboue half the distance A B. make the arch D E F G.

Then with the ſame diſtance, ſetting one foot in B. croſſe that arch in the points D F. and drawe the line D F. Then ſet alſo one foot in C. and with the ſame diſtance croſſe againe that arch in the points G E. and drawe alſo the line E G. which cutteth the line D F. in H. So is H, the Center: Therefore ſet one foot in H. and extend the other to any of the points A B C. and make the Circle A B C. which ſhall paſſe by the three giuen points required.

Prob. XI.

Of three lines giuen, ſo the two ſhorteſt together be longer then the third, to make a Triangle.

Let A B and C. be three lines giuen, whereof it is required to make a Triangle.



TAke the line A. and laye it downe from D, to E. Then take the line B. with your Compaſſes: and ſetting one foot in E. make the arch F. that done, take the line B. and ſetting one foot in the end D. with the other croſſe that arch in G. Laſtly, draw the lines D G. and C E. ſo ſhall you include the Triangle D G E. whoſe three ſides ſhall be equall to the three lines A B C. required.

Prob. XII

Prob. XII.

To make a right angled Triangle, the two containing sides being giuen.

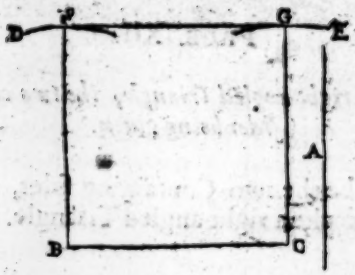
Let A B. be the two Containing sides, and it is required, to make a right angled Triangle.

TAke with your Compasses, the line A. and laye that down from C, to D. Then take also the line B. and setting one foot in the end C. with the other, make the arch E. That done by the third proposition vppon the end C. erect a perpendicular to cut the arch E. in F. Lastly, drawe the line F D. so shall you include the right angled Triangle C D F. whose two containing sides C D. and D F. are equall to the giuen lines A, & B. which was required.

Prob. XIII.

To make a square, the side being giuen

Let A, be the side of a square and it is required to make out the square.

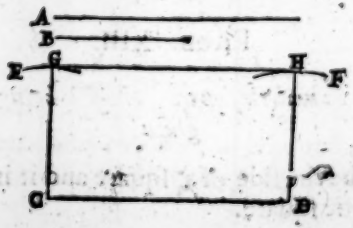


TAke the line A. with your Compasses, and lay that downe from B. to C. then with the distance B C. setting one foot in B. make the arch D. Set also one foot in C. and make the arch E. Then by the third Proposition, erect a perpendicular vppon the end B. to cut the arch D, in F. That done, take the
46. 1. distance B C, and setting one foot in F, with the other cosse the arch E, in G. Lastly, drawe the lines F G, and G C, so shall you include the Square B F G C, whose side shall be equall to the line A, required.

PROB. XIV.

To make a Parralellograme or a long Square, the length and breadth being given.

Let A, and B, be the length and breadth given, and it is required to make the long square.



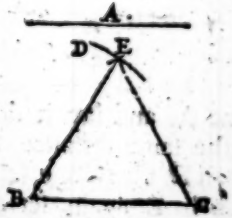
Take

Take the length A. with your Compaſſes, and lay that downe from C. to D. Then take alſo the breadth B. and ſetting one foot in the end C. with the other make the arch E. the like doe at the end D. and make the arch F. Then by the third propoſition upon the end C. erect a perpendicular, to cut the 3l. 3. arch E. in G. That done, take the length CD, and 3l. 1. ſetting one foot in G. with the other croſſe the arch F, in H. Laſtly, drawe the lines GH. and HD. ſo ſhall you include the long ſquare CGH D. whoſe length and breadth ſhall be equall to the lines A, and B, required.

Prob. XV.

To make an Equilater triangle, the ſide being giuen.

Let A, be a line giuen, and it is required to make an Equilaterall triangle, whoſe ſide ſhall be equall thereunto.



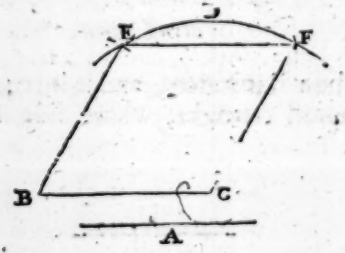
Take the line A. and lay it downe from B. to C. Then with the ſame diſtance, ſetting one foot in B, with the other make the arch D. that done ſet one

foot in C, and crosse the arch in E. Lastly, draw the lines C E, and E C. so shall the Triangle B E C, be equilaterall, and his side equall to the giuen line A. which was required to be made.

Prob. XVI.

To make a Rombus the side being giuen.

Let A. be a line giuen, and it is required to make a Rombus, whose side shall be equall thereunto.



TAke the line A, and lay it downe from B, to C, then with the same distance, setting one foot in C. make the arch D. that done, set one foot in B, and crosse that arch in E. again, set one foot in E. and crosse the same arch againe in F. Lastly, drawe the lines B E. EF. and F C. so shall you inclose the Rombus B E F C. whose side shall be equall to the line A, required.

Prob. XVII

Prob. XVII.

To make a Romboides, the length and breath being giuen.

Let A, and B. be the length and breath giuen, and it is required to make the Romboides.

TAke the length A, and lay it downe from C, to D. Then take alſo the breadth B, and ſetting one foot in the end C, with the other, take any where a point as E. and drawe CE. then with the ſame diſtance ſetting one foot in the end D, with the other make the arch F. That done, take the whole length CD. and ſetting one foot in E, with the other croſſe the arch F, in G. Laſtly, draw the lines EG, and GD. ſo ſhall you include the Romboides CEGD, whoſe length and breadth ſhall be equall to the lines A, and B, required.

Prob. 18.

To make a Romboides the length, and breadth being giuen, whoſe two appoſite angles ſhall be each equall to an angle giuen.

Let in the firſt Diagram A, and B. be the length and

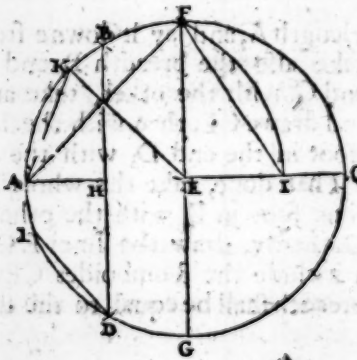
and breadth giuen, and let it be required to make a Romboides whose length and breadth shall be equall
23. 1. thereunto, and hauing two of his oppoſite angles,
31. 1. each equall to the angle H.

FIrſt lay downe the length from C, to D. Then by the ſeauenth propoſition make the angle E C D. equall to the angle H. Yet drawe the line C E. but of the length of the line B. and then finiſh it as in the laſt propoſition.

PROB. XIX.

To deuide a Circumference of a Circle into any part not aboue 10.

Let A B C D. be a circle giuen to be ſo deuided.



FIrſt drawe the Diameter AEC, which deuides the Circumference into two equall parts. Then take the ſemi-diameter, and ſetting one foot in A. with the other foot make in the Circumference the points B and D.

B, and D, and drawe B D, which ſhall goe thriſe about the Circle. that done, by the firſt propoſition deuide the Diameter A C. into two equall parts at right angles with F G. then drawe A F, which ſhall be $\frac{1}{7}$ part. That done, ſet one foote in H. (where the third part cutteth the Diameter A C.) and extend the other to F, and make the arch F I. then drawe the right line F I. which ſhall be $\frac{1}{7}$ part. 17. Def. 15. 4. 6. 4. 6. 2. 47. 1. 9. 10. 13.

The ſixt part is alwayes the Semi-diameter.

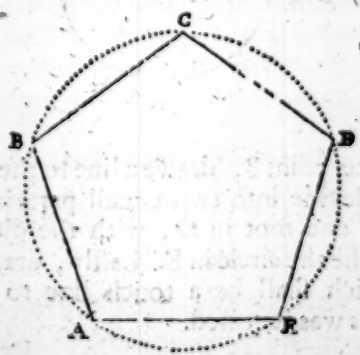
The $\frac{1}{7}$ part is halfe the third, viz. B H, or H D. For the eight part, deuide by the eight propoſition the the angle A E F, into too equall parts, with the line E K which cuteth the limbe in K. then drawe A K. which ſhall be the eight part.

For the ninth take alwayes $\frac{1}{9}$ of the arch B A D, as D L.

The teuth is alwayes the line E I.

Prob. XX.

To make a Poligon of fiue equall ſides and angles, otherwayes called a Pentagon.

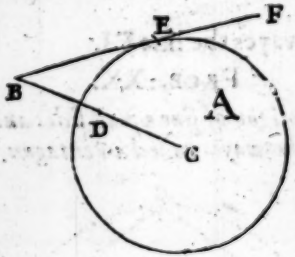


FIrſt make an obſcure Circle, then by the laſt propoſition finde the fifth part, which ſet five times about in the lymbe, as you ſee by the letters A B C D E, and drawe lines from point to point, ſo ſhall you include a Pentagon, as A B C D E, which was required.

PROB. XXI.

From a point aſſigned, to drawe a touch line to a Circle giuen.

Let A, be a Circle giuen, and let it be required to drawe a touch line thereunto from the point B.



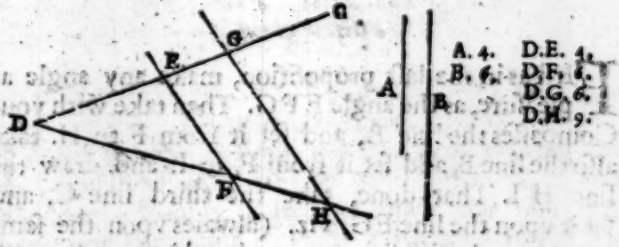
FRom the point B, drawe a line to the Center C, which devide into two equall parts in D. Then keeping one foot in D, with the diſtance D B. or D C. croſſe the circle in E. Laſtly, drawe the line B E F, which ſhall be a touch line to the giuen Circle A. as was required. 17. 3.

PROB. XXII.

PROB. XXII.

Vnto two lines given, to finde a third proportionall line.

Let A and B. be two lines given, and let it be required to find a third line in proportion to them.

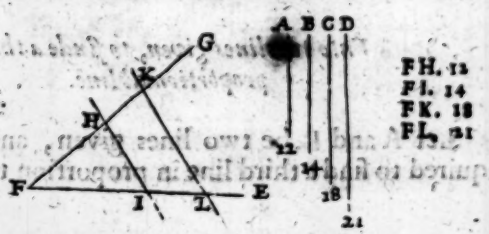


FIrst make any angle as C D H. then set the line A, from D. to E, and the line B. from D to F. and also from D, to G. Then drawe E F. that done, by the point G. draw a Parralell to E F. as G H. so shall D H, be the third proportionall line required. 11. 6.

PROB. XXIII.

Vnto three lines given, to finde a fourth in proportion, that is to perform the rule of three in lines.

Let A B, and C. be three lines given, and it is required to finde a fourth proportionall line.



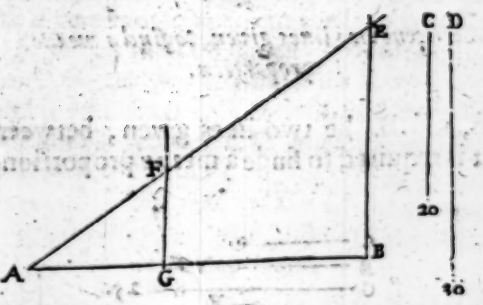
First as in the last proposition, make any angle at pleasure, as the angle E F G. Then take with your Compasses the line A, and set it from F to H. take also the line B, and set it from F, to I. and draw the line H I. That done, take the third line C, and
12. 6. set it vpon the line F G, viz. (alwaies vpon the same line where the first line A, was placed) from F, to K. Then by K, draw a Parralell to H I. as K L. to cut F E, in L. so shall F L. be the fourth proportionall line required.

Prob. XXIIII.

To deuide a line giuen, into two parts, in proportion one to the other according to two lines giuen.

Let A B, be a line giuen, to be deuided into two such parts, that the lesser may be in proportion to the greater: as the line C, to the line D.

From



A F. 20.
F E. 30.
A G. 16.
G B. 24.

FRom the end A draw the line A E, making the angle B A E. then set the line C, from A, F, and the line D, from F, to E. and draw the line E B. Lastly, by the point F, draw a Parralell to E B, as F G, to cut A B, in G. so shall A B, be deuide in G. as C, to D. which was required 10. 6.

PROB. XXV.

To cut off from a line given, any part or parts required

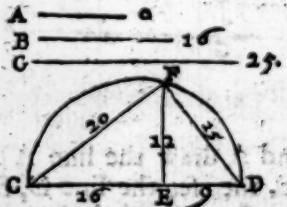
Let in the last Diagram, A B, be a line given, and let it be required to cut off from it $\frac{2}{3}$ parts.

FIrst from the end A, draw the line A E, making any angle as B A E, then set on any five equall parts from A to E, and also two of the same parts from A, to F. That done, draw the line E B. Then by F, draw a Parralell thereunto, to cut A B, in G. so shall A G, be the $\frac{2}{3}$ parts of A B, which was required. 9. 6.

Prob. XXVI.

Betweene two lines given, to find a meane proportion.

Let A, and B. be two lines given, betweene the which it is required to finde a meane proportion.



JOyne the lines A, and B. so together that they make one right line as C D, being joyned together in the point E. and uppon the line CD, described the Semi-
13. 6. circle viz. CFD. Then vppon the point E, where the lines A, and B. being joyned together meet, erect a Perpendicular to cut the lymbe in F. as E F, which shall be a meane proportion betweene the lines A, and B, required.

Another way.

AGaine, in the same Diagram, let the lines A, and G, be giuen, betweene the which it is required to finde a meane proportion. Take the line G. and loye it downe from C, to D. and draw CD. where-

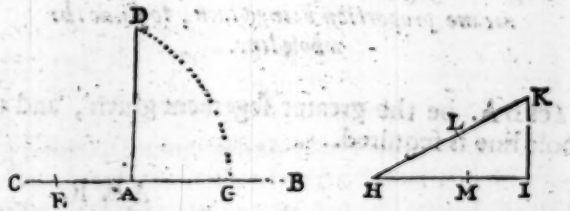
upon

upon deſcribe the Semi-circle C F D. Then take the line A. and ſet it from D, to E. then upon the point E. erect a perpendicular to cut the lymbe in F. Laſtly, draw D F. which ſhall be a mean proportion between D E. and D C. or between the lines A, and G. required: and if you draw C F. it ſhall be a mean between B. and G. that is between C E. and C D. 31. 3. 8. 6. 4. 6.

PROB. XXVII.

To devide a line given, by extream and mean proportion.

Let A B, be a line given to be devided by extream and mean.



A B 10.
A G, R.
125.---5.

I H. 10.
I K, 5 H L.
or H M, R.
125.---5.

INcreaſe A B. at length to C. Then upon the point A. erect a perpendicular as A D. of the length of A B. That done, take half A D. or A B. and ſet it from A. to E. then with the diſtance E D. make the arch D G. ſo ſhall A B. be devided by extream and mean proportion in G. and A G. is the greater ſegement, and G B. the leſſer. 11. 2.

Another

Another way.

Againe, in the last Diagram let H I. be a line giuen, to be deuided by extreame and mean proportion.

VPon the end I, erect a perpendicular as I K. of the length of halfe the giuen line H I. then draw the
11. 2. subtendant side H K. that done, set K I. from K. to L. Againe, set H L. from H. to M. so shall H I. de deuided by extrame and meane proportion in M. And H M. shall be the greater segement, and M I. the lesser.

Prob. XXVIII.

The greater segement of a line deuided by extreame and meane proportion being giuen, to finde the whole line.

Let B A. be the greater segement giuen, and the whole line is required.

A B. R.
125---5
C B. 10

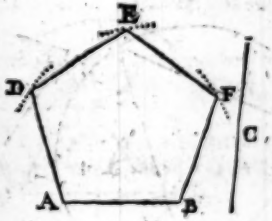
INcrease B A. to C. then uppon the end B. erect a perpendicular of $\frac{1}{2}$ the length of A B. as B D. And draw the subtendant side A D. From which substract D B. rest A F. that done, set A F. from A. to C.
2 Theo. 13. so shall C B. be the whole line required.

Prob.

Prob. XXIX.

Upon a line given to describe a Pentagon.

Let A. B. be a line given, whereupon a Pentagon is to be made.

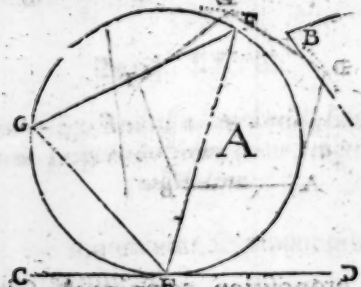


BY the last proposition, counting the side A B. to be the greater segement of a line devided by extream and mean proportion, finde the whole line, which let be the line C. Then with that distance setting one foot in B. make the arches D. and E. Also set one foot in A. and make the arch F. That done, with the distance of the given side A B. setting one foot in A. crosse the arch D in D. and setting one foot in B. crosse the arch F in F. also set one foot in F. and cross the arch E in E. Lastly, draw the lines A D, DE, EF. F B. so shall you include the Pentagon A D E F B. being made upon the line AB. which was required. 8. 13.

Prob. XXX.

From a Circle given, to cut off a ſection, wherein may be placed an angle, equall to an angle given.

Let A. be a Circle given, from the which it is requited, to cut off a ſection wherein may be placed, an angle equall to the angle B.



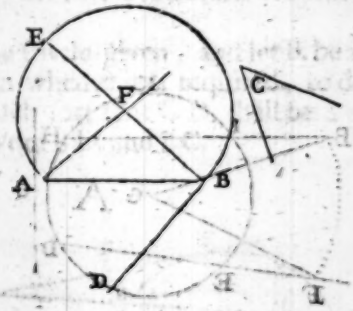
First draw a touch line by the 21. propoſition as CD. which toucheth the circle in E. then upon the point E. (by the ſeventh propoſition) make the angle DEF. equal to the angle B. by drawing the line EF. ſo ſhall the ſection E F G. contain an angle equall to the angle B. required: for count EF. the baſe of ſome triangle, and then from the ends E and F. draw lines to any point in the Circomference, as the line E G. and F G. meeting in the point G. and then the angle G. ſhall be equall to the angle B. as aforeſaid. 34.3.

Prob. XXXI.

PROB. XXXI.

Upon a line given, to describe such a section of a Circle, as may contain an angle, equall to an angle given.

Let A B. be a line given, and it is required thereon, to describe a section of a circle that may containe an angle, equall to the angle C.

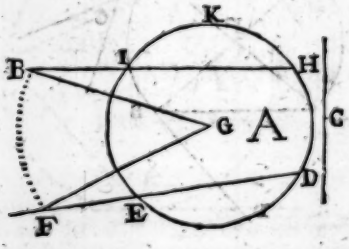


BY the seventh proposition drawne the line B D. making the angle A B D. equall to C. the angle given. Then upon the point B, erect a Perpendicular to DB, as BE. That done, make the angle F A B. equall to the Angle A B E. by drawing the line A F. which cutteth BE in F. so shall F be the Center, therefore, set one Foot in F. and extend the other to any of the ends A, or B, and make the arch A E B. which shall containe an angle equall to the angle, C, required.

PROB. XXXII.

From a point assigned, to draw a line to cut off an arch of a Circle, whose chord shall be equall to a line given, the said Chord being lesse than the Diameter of the Circle.

Let A, be a Circle given, and let B, be a point assigned, from whence it is required to draw a line to cut off such an arch from the Circle, whose Chorde shall be equall to the line C.



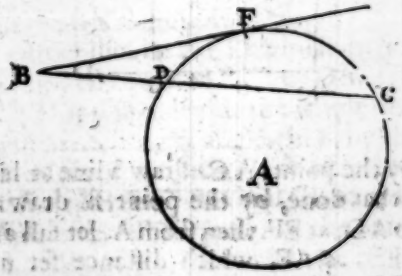
TAke with your Compasses the line C. and set it any where in the Circumference, viz. from D. to E. then draw the line DE. at length to F. that done, from B. draw a line to the Center G. then keeping one foot in G. with the other (at the distance G B.) make the arch BF. to cut DE. being drawn forth in F. That done, take FD. and setting one foot in B. with the other crosse the Circle in H. Lastly, draw the line BIH. which cutteth off the Arch IKH. whose Chord

Chord I H. is equall to C. the line given which was required.

Prob. XXXIII.

From a point without a Circle to draw a line, cutting off an arch in such sort, that the Chord of the arch cut off shall be a mean proportion, between the whole line drawn from the point to the further side of the Circumference, and the part of that line from the point to the neereſt side of the Circumference: wherein is to be noted, that the point without, muſt be ſo placed, that a touch line drawn from it to the Circle, may not exceed the Diameter of the Circle.

Let A. be a Circle given, and let B. be a point aſſigned, from whence it is required, to draw a line as B. C. in such sort that C D. shall be a mean proportion between B D. and B C.



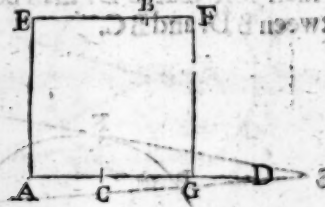
FIrſt, from the point B. draw by the 21. propoſition a touch line to the Circle, as B F. which toucheth in the point F. That done, count B F. 3. 6. 3.

the greater segmament of a line devided by extreame and meane proportion, and then by the 28. proposition finde the whole line, which take, and setting one foot in B. with the other crosse the Circle in C. Lastly, draw the line BC. which performeth your desire.

PROB. XXXIIII.

To make a Geometricall square to passe by any three points given.

Let A B C. be three points given, and let it be required to make a square to passe by them.



FIrst by the points A C. draw a line at length, as A D. that done, by the point B. draw a Parralell to A D. as EF. then from A. let fall a Perpendicular to EF. as AE. which distance set upon the Parralell E F. from E to F. set it also from A to G. and draw FG. so shall you include the Square AEFG which shall passe by the three points A B C. required.

31.1. 12.1.

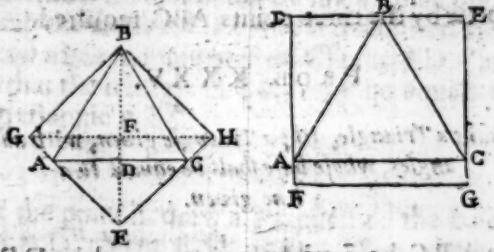
This is not so easie if the points given, make an equilaterall Triangle: wherefore I will shew you how

it

it may then be done, (which is divers wayes) where-of I will set two of the best.

Another way.

Againe, let ABC, be three points given, by which a Geometricall Square is to passe.



FIrst draw the lines AB. BC. and CA. inclosing the equilaterall Triangle ABC. then from the point B. let fall a perpendicular as B D. which increase to E. so that D E. may be equall to D C. or DA. (the $\frac{1}{2}$ of the side A C.) That done, devide the whole line BE. into two equall parts at right angles in F. by the line GH. then set alwayes, $\frac{1}{2}$ BE. from F. to G. and to H. Lastly, draw the lines BH. HE. EG. and GB so shall you include a square that shall passe by the points A B C, required. 8. 13.

Another way.

Againe, in the second figure of the last Diagram, on your right hand, let A B C. be three points given,

given, by which it is required to make passe a Geometricall square.

First, draw lines from point to point, making the Triangle ABC. That done, by B. draw a Parralel to AC. as DE. Then from A. let fall a Perpendicular upon the said DE. as AD. which increase downward to F. then set the distance AC. from D. to F. and therewith make the square DEGF. which shall passe by the three points ABC. required.

Prob. XXXV.

To make a Triangle, like a Triangle given, with all his angles, whose base shall be equall to a line given.

Let ABC. be a triangle given, and let DE, be a line given, Now it is required to make another triangle like the triangle ABC. whose base shall be equall to the line DE.

BY the seventh proposition from the end D. protract an angle equall to the angle A. as EDF. then from the end E. protract an angle equall to the angle B. as

B. as DEF. which ſhall incloſe the triangle DEF. like ABC. upon the baſe DE. which was required.

Prob. xxxvi.

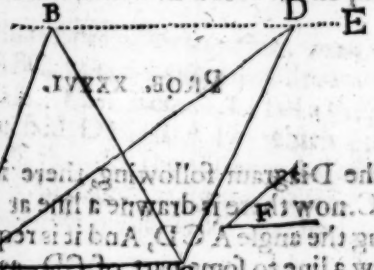
IN the Diagram following, there is a Triangle as ABC. now there is drawne a line at pleaſure, as CD making the angle A C D, And it is required from A. to draw a line to ſome part of CD. as AD. (in ſuch ſort) that the triangle A C D. may be equall to the given triangle A B C.

BY the point B. draw a Parralell to the baſe A C. as B D. to cut C D. in D. Then draw from the angle A. a line to the D. (as A D) ſo ſhall you include the triangle A C D. equall to the triangle A B C. which was required.

Prob. xxxvii

To reduce a Triangle into another Triangle, having the ſame baſe but other angles.

Let A B C. be a triangle given, and it is required to reduce the ſame into another triangle, having the ſame baſe but any other angles.



A C. 25.
Perp. from B to AC, 28.
Perp. from D, to AC, also 28,

By the ſecond way of the 6. Propoſition draw from the point B. a Parralell to the baſe A C. as B D E. Then from A. the one end of the baſe, drew a line to any point in that Parralell, as the line A D. (to the point D.) Laſtly, from the other end C. draw to the ſame point D. the line C D. ſo ſhall the triangle A C D. be equall to the triangle A B C. having the ſame baſe, viz. A C. but other angles which was required.

Prob. XXXVIII.

A Triangle being given, to make another equall thereunto upon the ſame baſe, and having an angle equall to an angle given.

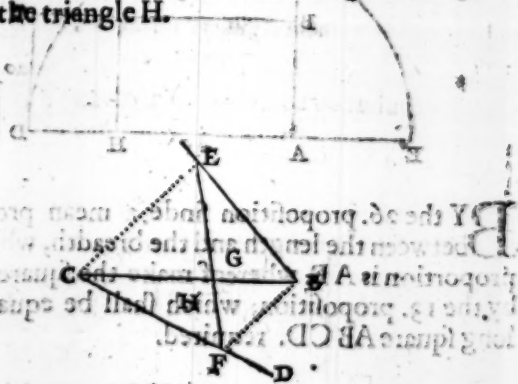
Let in the laſt Diagram, A B C, be a triangle given, and it is required to make another equall thereunto upon the ſame baſe, but having one angle equall to the angle F.

Firſt,

First by the top B. draw a Parralel to the base A C. by the second way of the sixt Proposition as B E. Then by the seventh proposition from the point A. make the angle C A D. equall to the angle F. and draw the line A D. till it touch the Parralel B E in D. Lastly, draw the line C D. so shall you include the triangle A D C. equall to the triangle A B C. upon the same base A C. having one angle (as C A D) equall to the angle F. required.

Prob. XXXIX.

Let A B. B C. and C D. be three lines given, making the two angles A B C. and B C D. and let E. be a point assigned, from whence it is required to draw a line as E F. in such sort that the triangle G. may be equall to the triangle H.



First from the point E. draw an obscure line to C. as the pricked line E C. then by the sixt proposition from B. draw a Parralel thereunto as B F. which

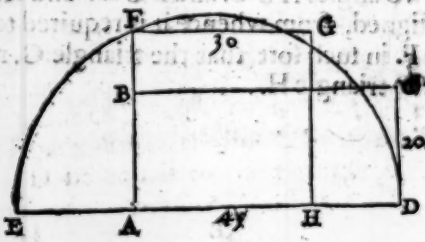
cutteth CD. in F. Lastly, draw the line EF. which performeth the desire.

These foure last Prob. have their demonstration out of the 37. 1. of Euclid.

PROB. XL.

To reduce a long square into a Geometricall square.

Let A B C D. be a long square given to be reduced into a Gemetricall square.



BY the 26. proposition finde a mean proportion, between the length and the breadth, which mean proportion is A F. whereof make the square AFGH. by the 13. proposition, which shall be equall to the long square AB CD. required.

PROB. XLI.

To reduce a Rombus into a Square.

FRom one of the obtuse angles, let fall a Perpendicular, to the base. Then finde a mean proportion between

betweene that perpendicular and the base, and that shall be the side of the square equall thereunto.

PROB. XLII.

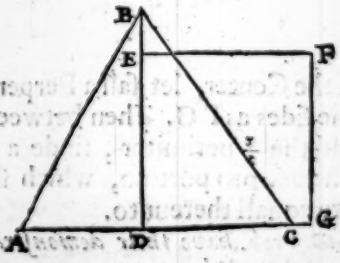
To reduce a Romboides into a Square.

FRom one of the obtuse angles, let fall a perpendicular upon the base (which must be one of the longest sides) Then betweene that perpendicular and the said base, finde a mean proportion, which shall be the side of a square equall thereunto.

PROB. XLIII.

To reduce a Triangle into a Square.

Let A B C. be a triangle given, to be reduced into a square.



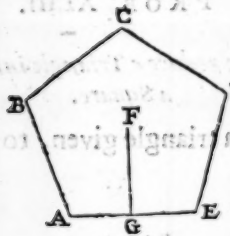
FIrst from the angle B. let fall a perpendicular to the base A C. as B D. Then by the 26. proposition finde

finde a mean proportion between the ſaid Perpendicular and the half baſe, which will be D E. whereof make the ſquare DEFG. which ſhall be equall to the triangle required.

Prob. XLIV.

To reduce a Poligon conſiſting of equall ſides and angles into a Square.

Let A B C D E. be a Poligon given, of five equall ſides and angles (more properly called a Pentagon) to be reduced into a ſquare.



Firſt from the Center, let fall a Perpendicular to one of the ſides as F G. Then between that Perpendicular and the $\frac{1}{4}$ perimiter, finde a mean proportion by the 26. proportion, which ſhall be the ſide of a ſquare equall thereunto.

Theſe five laſt Prob. have their demonſtration out of the 14. of the 2. of Euclid.

Prob.

Prob. xLV.

From a point in any ſide increaſed of a Triangle given, to draw a line to the oppoſite ſide, through the ſide next the point, to include a Triangle equall to the Triangle given.

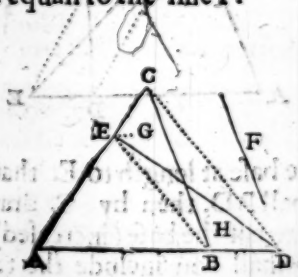
Let in the Diagram following ABC. be a triangle given, whoſe baſe A B. runneth forth to D. Now it is required from D. to draw a line to ſome part of the ſide AC. in ſuch ſort that ſo much as it cutteth off ſo much it may take in.

FRom the point D. to C. drawe an obſcure line as DC. then by B. draw a Parrallel thereunto, to cut AC in E. Lalſty, drawe DE. which ſhall cut off the triangle G. and take in the triangle H. equall thereunto.

Prob. xLVI.

A Triangle being given, to make another equall thereunto, whoſe baſe or Perpendicular, is limited.

Let ABC. be a triangle given, and it is required to make another equall thereunto, whoſe perpendicular ſhall be equall to the line F.



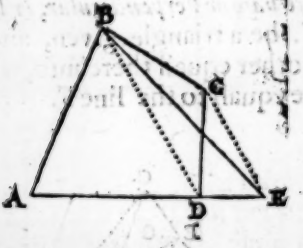
At

AT the distance of the line F. draw a Parralell to the base AD. which cutteth the side AC. in E. Then increase the base AB. at length to D. That done, draw E B. then by the point C. draw a parralell thereunto as CD. to cut the base being increast in D. Lastly draw E D. so shall you include the triangle AE D. equall to ACB. (for there is cut off the triangle G. and taken in the triangle H. equall thereunto.

PROB. XLVII.

To reduce a Trapezia into a triangle

Let A B C D. be a Trapezia given, to be reduced into a triangle.



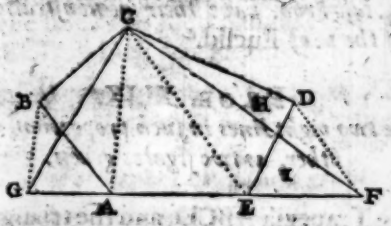
INcrease the base at length to E. that done, draw the Diagonall B D. then by C. draw a Parralell thereunto, to cut the base (increased) in E. Lastly, draw B E. so shall you include the triangle A B E. equall to the Trapezia given required.

PROB. XLVII.

PROB. XLVIII.

From an angle in plot given, to draw a line to the base, increased (if so it require) that shall take in so much as it cuts off.

Let A B C D E. be a plot given, and it is required to draw a line from the angle C. in such sort, that the triangle H. cut off, be equall to the triangle I. taken in.



First increase the base that way as the line from C is to be drawn, viz. to F. then draw the obscure line C E. that done, from the point D. drawe a Parralel thereunto, to cut the base (being increased) in F. Lastly, draw C F. which performeth the demand.

Again, let it be required from C. to draw a line towards the left hand, as C G. in such sort, that so much as is cut off may be taken in. Increase the base E A. to G. then draw C A. that done, by the point B. draw a Parralell thereunto as B G. to cut E A. (increased) in G. Lastly, draw the line C G. which shall take in so much as it shall cut off.

Note, Hereby may be gathered, how to reduce a plot into a triangle, with lines drawn from an angle assigned: for let the base be first increas'd both waies Then draw C. F. as before taught, cutting off the triangle H. and taking in the triangle I. equal thereunto, (so is there nothing lost) For the Trapezia ABCF. is equall to the plot ABCDE. Again, (by the same rule) let CG. be drawn, taking in so much as it cutteth off, so shall the triangle CGF. be equall to the Trapezia ABCF. or unto the plot ABCDE. required.

These 4. last Prob. have their demonstration out of the 37. of the 1. of Euclid.

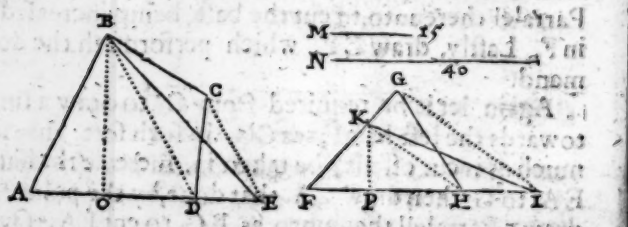
PROB. XLIX.

To give two right lines in such proportion, one the other, as two figures given.

Let the Trapezia ABCD. and the triangle FGH. be two figures given, and it is required to give two right lines in proportion as the triangle to the Trapezia.

Fl, 45 p. 12
FG 30. p. 18

AB. 45.
Per. from B.
52.

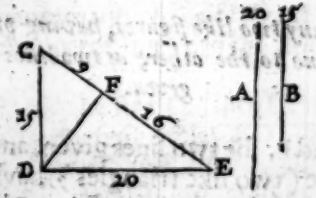


BY the 47. probleme bring the Trapezia into the triangle ABE. Then increaſe the baſe of the triangle FG. to I. till it be of the length of AE. (the baſe to the triangle ABE) Then by the 46. problem, bring the triangle FGH. into the triangle FKI. whoſe baſe FI. is equal to AE. (the baſe to ABE.) That done, take the perpendicular or ſhorteſt diſtance of the triangle FKI. from K. on the baſe FI. which is the line M. Likewiſe, the perpendicular or ſhorteſt diſtance (in the triangle ABE) from B to the baſe A E. which is the line N. ſo ſhall the line M. have the ſame proportion to the line N. as the triangle FGH. to the Trapezia, ABCD. which was required. 37. 1. 1. 6.

PROB. L.

To give two right lines, having ſuch proportion one to the other, as two ſquares given.

Let A and B, be the ſides of two ſquares, given, and it is required to give two right lines, having the ſame proportion one to the other, as the ſquare made of the line A. hath to the ſquare made of the line B.



JOyn the lines A and B. so together, that they make a right angle, as C D E. and draw the subtendant side C E. Then from the right angle D. let fall a perpendicular to C E. (as D F) which deuideth C E into two parts in F. which parts C F. and E F. are two right lines in proportion one to the other, as the square of A. to the square of B. For as C F. to E F. so the square of A. to the square of B. which was required.

8. 6.
4. 6.
Cor. 19. 6.

And not only 2. right lines may this way be given, having proportion together as 2. squares, but as 2. Circles, triangles, or other figures, whose angles are alike, and sides proportionall, as if A. and B. were the Diameters of 2. Circles, then the lines C F. and E F. have the same proportion one to the other as those Circles.

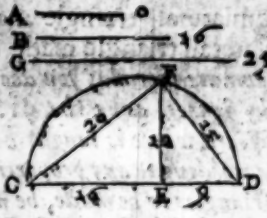
Againe, let A and B. be 2. sides of 2. equiangled triangles, Then their Contents are as C F. to E F. and the like of 2. *Pentagons, Hexagons, Heptagons, &c.*

PROB. LI.

To make any two like figures, having proportion one to the other, as two lines given.

Let A. and B. be two lines given, and it is required, to make (two like triangles) having the same proportion together, as the line A. to the line B.

Joyne



JOyne the lines A. and B. so together that they make one line as C D. whereupon describe the semicircle, CFD. Then upon the point E. where the lines are joyned together, erect a perpendicular to cut the lymbe in F. as E F. Lastly draw the lines DF and CF. which shall be the sides of the triangles required. For an equilaterall triangle, made of the line DF. shall have the same proportion, to an equilaterall triangle made of the line C F. as the line A. to the line B. which was required. Cor. 19. 6. 8. 6. 4. 6.

Or thus.

Again, in the same Diagram, let A. and G. be two lines given, and it is required to give the sides of two equilateral triangles, which shall have the same proportion together as the line A. to the line G.

FIrst, lay downe the line G. from C. to D. whereupon describe the semicircle CFD. Then take the line A. and set it from D. to E. and upon the point E. erect a perpendicular to cut the lymbe in F. Lastly drawe DF. so shall DF. and DC. be the sides of two Equilaterall triangles, having the same proportion

one to the other, as the line A. to the line G. For as A to G. ſo an Equilaterall triangle made of the line DF. to an Equilaterall triangle made of the line DC.

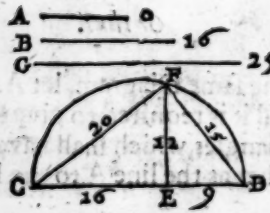
And in the ſame manner may you doe for Squares, Circles, or other like figures, as by the 91. *Probleme doth more plainly appeare, where is taught how to increaſe or decreaſe a plot according to any proportion given.*

But if your triangles to be made, be not Equilaterall, Then, muſt you doe the like for every of the ſides apart, or elſe, by the rule of proportion, (having thus found one of their like ſides) finde the reſt, &c.

PROB. LII.

To devide a line in power according to any proportion given.

Let CD. be a line given, to be devided in power as A. to B.



BY the 24. probleme devide CD. in E. as A. to B. viz. that as A. to B. ſo the leſſer part DE. to the greater part EC. That done, deſcribe upon the line CD. the ſemi-circle CFD. then upon the point

E. erect a perpendicular to cut the limbe in F. Lastly, draw the lines DF. and CF. which together in power shall be equall to the power of the given line C D, and yet in power one to another, as A. to B which was required. 31.3. 47.1. 8.6. 4.6. 2 Cor. 10.6

Prob. LIII.

To inlarge a line in power according to any proportion assigned.

Let (in the last Diagram) CE. be a line given, to be inlarged in power as B. to G.

BY the 23. probleme, say if B. give G. what CE? answer CD. whereupon describe the semi-circle CFD. that done, upon the point E. erect a Perpendicular to cut the limbe in F. Lastly, drawe CF. which shall be in power to CE. as G. to B. which was required.

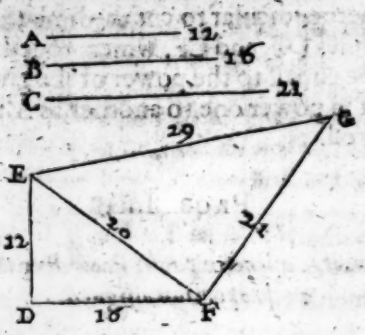
The demonstration hereof may be gathered from the places of Euclid *set downe by the last Probleme.*

Prob. LIIII.

To adde 2. 3. or more Squares together in one.

Let AB. and C. be the sides of three squares given and it is required to adde them altogether in one, that is to finde the side of one square, which shall be equall to them all.

Of



OF the two ſides A. and B. make a right angle as the angle EDF. then drawe the ſubtendant ſide E F. which ſhall be the ſide of a ſquare equall to both the ſquares made of the lines A. and B
47. 1. together. That done, upon the end F. (of the line EF) erect a perpendicular of the length of the line C. as FG. Then drawe EG. which ſhall be the ſide of a ſquare equall to three ſquares whoſe ſides are the lines A. B. C. required.

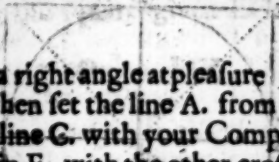
And in the ſame manner may you adde Circles, like Triangles, and other like figures together, as appeareth by the 31. *Prop. of the* 6. *of* Euclid.

PROB. LV.

To ſubſtract one ſquare from another.

In the laſt Diagram, let it be required to ſubſtract the

the ſquare of the line A. from the ſquare of the line C.



FIrſt make a right angle at pleaſure (as the angle E D F.) then ſet the line A. from D. to E. that done take the line C. with your Compaſſes, and ſetting one foot in F. with the other croſſe the line D E. in E. ſo ſhall D E. be the ſide of a ſquare remaining, when the ſquare of A. is taken from the ſquare of C. which was required. 47. 1.

PROB. LVI.

Within a Circle given, to inſcribe a Square.

Let in the Diagram Following A B C D. be a circle given, wherein a ſquare is to be inſcribed, &c.

DRawe through the Center the Diameter A C. which croſſe at right angles, with B D. then drawe the lines A B. B C. C D. and D A. ſo ſhall you inſcribe a ſquare within a Circle, which was required. 6. 4.

PROB. LVII.

About a Circle given to deſcribe a Square.

Let A B C D. be a Circle given, about the which it is required to deſcribe a ſquare.

FIrſt draw the two Diameters AC. and BD. croſſing one another at right angles, which cut the Circle in the points ABCD. then by the points B. and D. draw Parralels to AC. alſo, by A and C. 7.4. parralells to BD. which four lines meeting in the points EFGH. ſhal make the ſquare required.

PROB. LVIII.

To inſcribe a Circle within a ſquare.

Let in the ſame Diagram, EFGH. be a ſquare given, and it is required to inſcribe a Circle within it.

DRaw the Diagonnals EH. and FG. which cut one the other in I, which is ꝑ Center. From whence 8.4. let fall a perpendicular to one of the ſides of the ſquare, as ID. with which diſtance ſetting one foot in

in the Center, make the circle ABCD. which ſhall ſtand within the ſquare given EFHG. as was required.

PROB. LIX.

To circumſcribe a Circle about a ſquare.

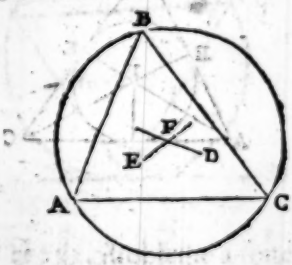
Let in the 57. Probleme ABCD. be a ſquare given, about which a Circle is to be made.

DRaw the Diagonnals AC. and BD. which cut one another in I. which ſhall be the Center. Therefore ſet one foot in I. and extend the other to any of the points A.B.C.D. and make the Circle ABCD. which ſhall compaſſe the given ſquare required. 9.4.

PROB. LX.

About a Triangle, to deſcribe a Circle.

Let ABC. be a triangle given, about the which is required to make a Circle.



Suppose the 3. corners A B C. to be three points given, then by the 10. probleme bring those 3. points into one Circumference, so shall you make the Circle A B C. to include the triangle required.

Or, (which is all one) devide any 2. sides of the triangle into 2. equal parts at right angles by the
5.4. first probleme, as the side AB. with the line D. and BC. with the line E. (if they were drawn forth.) Which 2. lines meet in the point F. which shall be the Center, then set one foot in F. and extend the other to any of the angles ABC. and make the Circle ABC. which shall include the triangle ABC. required.

PROB. LXI.

Within a Triangle given, to inscribe a Circle.

Let ABC. be a triangle given, wherein a circle is is to be inscribed.

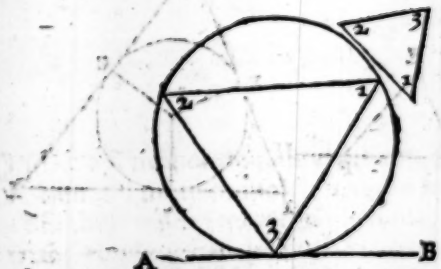
By

BY the eight Probleme devide any two of the angles into two equall parts, as the angle A C B. with the line CD. and the angle BAC. with the line AE. which two lines meet in F. so is F. the Center, from whence let fall a perpendicular to any of the sides (as FG.) upon the side AC. with which distance make the circle DEG. upon the Center F. which shall stand within the given triangle ABC. required. 44.

PROB. LXII.

To inscribe within a Circle, a Triangle, whose sides shall be in proportion one to the other, as the sides of a triangle given

Let 1.2.3. be a circle given, wherein it is required to inscribe a triangle, whose sides shall have proportion together as the sides of the little triangle 1.2.3, &c.



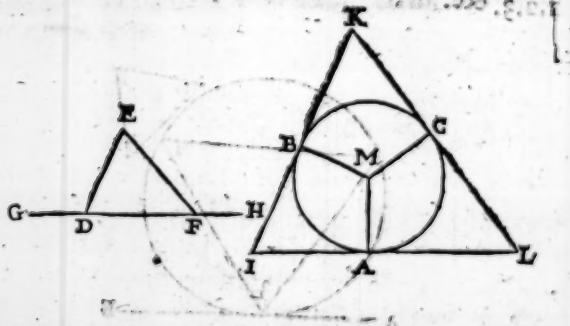
DRaw by the 31. Probleme a touch line as A.3 B which toucheth the circle in the point 3. Then make the angle A.3.2. equall to the angle

the little triangle, and the angle 1. 3. B. equall to the angle 2. of the ſame little triangle by the 7. Problem Laſtly, draw in the circle the line 2. 1. ſo ſhall you inſcribe the triangle 1, 2, 3. within the circle, whoſe ſides ſhall be in proportion one to the other, as the
2.4. ſides of the leſſer triangle 1, 2, 3. which was required.

PROB. LXIII.

About a Circle given, to diſcribe a triangle, whoſe ſides ſhall have proportion one to the other, as the ſides of a triangle given.

Let A B C. be a circle given, about the which it is required to deſcribe a triangle, whoſe ſides ſhall be in proportion one to another, as the ſides of the triangle DEF.

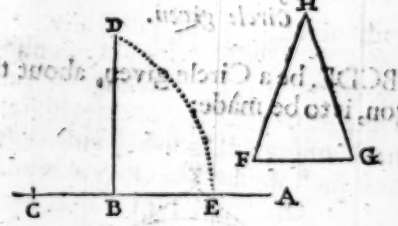


INcreaſe the baſe DE. on both ſides, to G. and to H. making the angles EDG. and EFH. That done, from M. the center of the circle, draw a line to any part of the circumference, (as M A.) Then make the

the angle AMB. equall to the angle EDG. alſo the angle AMC. equall to the angle EFH. That done, upon the points A.B.C. erect perpendiculars, which will meet in the points K.L.I. ſo ſhall the ſides of the triangle KLI. have proportion together, as the ſides of the given triangle DEF. which was required. 3.4.

Prob. LXIIII.

To make ſuch an Iſoſceles Triangle, that ſhall have each angle at the baſe, double to that at the toppe.



BY the 27. propoſition devide any line, by extream and mean proportion, as the line AB. in E. ſo is BE. the greater ſegement. Then make an *Iſoſceles* triangle, whoſe baſe let be the ſaid greater ſegement, and the other ſides each the whole line AB. as FGH. which ſhall be the triangle required. 10.4.

Prob. LXV.

Prob. LXV.

Within a Circle given, to inscribe a Pentagon.

Let in the Diagram following A B C D E. be a circle given, wherein a pentagon, is to be inscribed.

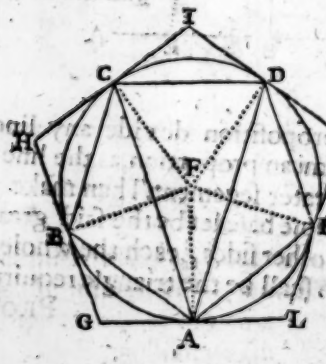
BY the last Probleme make such an *Isosceles* triangle as was there taught, having each angle at the base, double to that of the top. Then by the 62. Probleme inscribe within the circle given a triangle, like that, as the triangle ACD. whose base C D. set five times in the limbe, so shall you include the Pentagon ABCDE. within the circle which was required.

11.4.

Prob. LXVI.

To Circumscribe a Pentagon, about a Circle given.

Let ABCDE. be a Circle given, about the which a Pentagon, is to be made:



First, inscribe the Pentagon, A B C D E. as before taught, then from the center F, draw lines to every of the points A.B.C.D.E. That done, upon every of those lines, on the points A B C D E. erect perpendiculars, which will meet in the points G H I K L. which shall include a Pentagon, about the circle which was required. 12.4.

Prob. LXVII.

Within a Pentagon given, to inscribe a Circle.

Let in the last Diagram G A I K L. be a pentagon given, within the which a circle is to be inscribed.

Divide any two of the sides in the midst, at right angles, as the side I K. with the line D F. and the side G L. with the line A F. which meet in F. so is F. the center. Then setting one foot in F. extend the other to one of the points A. or D. and make the circle A B C D E. which shall stand within the Pentagon G H I K L. required. 13.4.

Prob. LXVIII.

To reduce a long square into another long square whose length or breadth is limmited.

Let A B C D, be a long square given, to be reduced

ced in to another long ſquare, whoſe length ſhall be equall to the line E.

E. 48.
A B. 24.
F C. 40.
F H. 10.

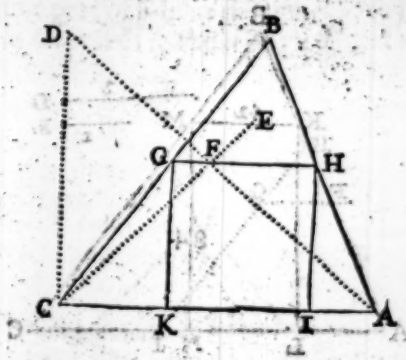
INcreaſe A D. to F. then ſet the line E. from A. to F. That done, by the 23 Probleme, ſay if E. give
p. 23. length B C. what the breadth A B. anſwere A G. for the breadth (of the long ſquare to be made) and A F. or E. is the length, whereof make the long ſquare A G H F. which ſhall be equall to the long ſquare A C. and yet his length A F. equall to the given line E. which was required.

PROB. LXIX.

Within a Triangle, to inſcribe a Square.

Let A B C. be a triangle given, wherein a ſquare is to be inſcribed.

Upon



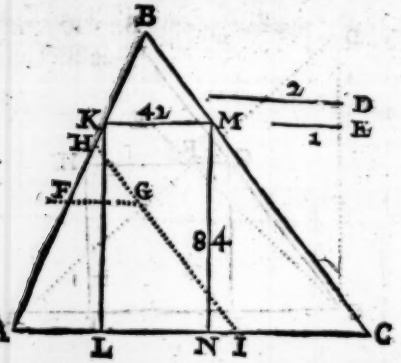
A B 169.
A C. 182.
C B. 195.
G H. 84.

Vpon the end C. erect a perpendicular of the length of the perpendicular, from B. upon the base A C. (as C D.) then draw the subtendant side A D. That done devide the right angle ACD. into two equall parts (by the 8. Probleme) with the line C E. which cutteth AD. in F. Lastly, by the point F. draw a Parralell to the base AC. as G H. whereof make the square G H I K. which shall stand within the triangle ABC. required. 32.1. 6.1. 12.6.

Prob. LXX.

Within a Triangle, to inscribe a Parralellogram, whose sides shall have proportion together, as two lines given.

Let ABC. be a triangle given, and let it be required to inscribe within it a long square, whose length shall have proportion to his breadth as the line D. to the line E.



AB. 130.
AC. 140.
CB. 150.
BM. 45.

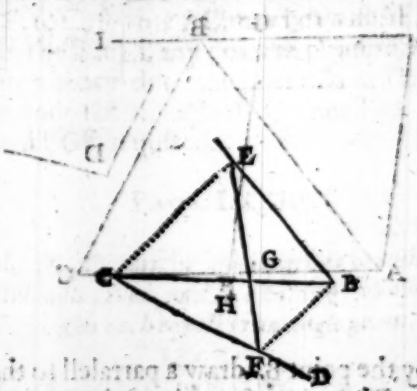
AT the diſtance of the length D draw a Parrallel to the baſe A C, as F G. to cut the ſide A B. in F. then ſet the breadth E. on the parrallell from F. to G. and by G. draw a parrallell to the ſide B C. as H I. to cut A B. in H. Then ſay by the 23. Problem, if A H give A F. what A B? anſwer A K. from which point K. let fall a perpendicular to the baſe A C. as K L. alſo, from K. draw a parrallell to A C. as K M. to cut the ſide B C. in M. Laſtly, from M. let fall a perpendicular to A C. as M N. ſo ſhall you include the long ſquare L K M N. within the triangle A B C. whoſe length ſhall be to his breadth as the given lines D. to E. which was required.

4.6.
12.6.

PROB. LXXI.

There is an angle B C D. and from a point as F. in the line C D. is drawn a line by chance of any length as F E. cutting off from the angle B C D. the triangle H. Now it is required from B. to draw a line

line to some part of F E. as the line B E. to include a triangle as G. equall to the triangle H. cut off.



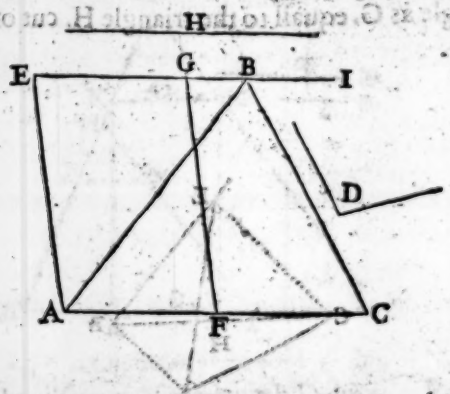
BF, is the parralells distance 25

DRaw from the end B. to the point F. a blinde line as BF, then from C. draw a parralel there- 37. 1. unto as CE. to cut the line FE. in E, Lastly, draw the line B E. so shall you include the triangle G. equall to the triangle H. cut off, which was required.

PROE. LXXI.

To make a Romboides equall to a Triangle given, having two opposite angles each equall to an angle given.

Let A B C. be a triangle given, and it is required to reduce the same into a Romboides, having two opposite angles each equall to the angle D.



A C.36. p.ſt6 B.28. A F.18. p. ſt6 G.28

FIrſt, by the point B. draw a parralell to the baſe A C. as E B I. then from the end A. protract an angle equall to the given angle D. as C A E. and draw A E. till it touch the parralell in E. that done take ½ the baſe A C. which is A F. and ſet it in the ſame Parralell from E. to G. Laſtly, draw F. G. ſo ſhall you incloſe the Romboides A E G F. equall to the triangle A B C. and having two oppoſite angles E. and F. each equall to the angle D. which was required.

42. 1.

PROB. LXXIII.

To reduce a Romboides into a Triangle.

Let in the laſt Diagram, AEGF. be a Romboides given, to be reduced into a triangle.

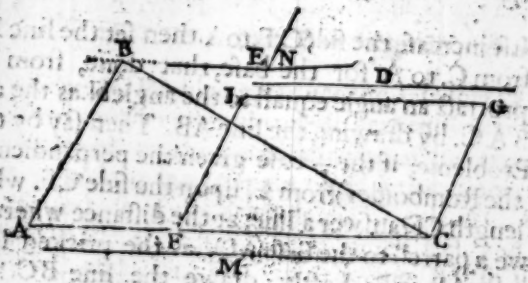
Firſt,

FIrſt increaſe the ſides E G. and AF. to I. and to C. then ſet AF. the breath of the Romboides from F. to C. ſo that AC may be twiſe AF. that done take in the line EI any point at pleaſure, as the point B. from whence draw the lines BA. and BC. ſo ſhall you include the triangle ABC. equall to the Romboides AEGF. required. 41.1

PROB. LXXIIII.

To make a Romboides, whoſe length is limmited, equall to a triangle given, and alſo having two oppoſite angles each equall to an angle given.

Let ABC. be a triangle given, and let it be required to make a Romboides equall thereunto, whoſe length ſhall be as long as the line D. and having two oppoſite angles, each equall to the angle E.



AC, 48. p frō. B. 20. CF. 30. p frō. L. 16. D. 30. M 48.

FIrſt, take the length D. and ſet it from C. to F. then from C. protract an angle equall to the angle E. as F C G. that done, ſay by the 23. Probleme if the line

line D. give the perpendicular from B. to A C. what ½ the base AC. answer a line, at which distance draw a patralell to AC. as G L. (of the length of C F.)

P.7. Lastly, drawe F L. so shall you include the Romboi-
P. 1. des C G L F. whose length C F. shall be equall to the
P. 23. given line D. and his opposite angles C. and L. each
P.5. equall to the angle E. which was required.

PROB. LXXV.

A Romboides being made by chance, it is required to make a triangle equall thereunto, whose base shall be equall to a line given, and having an angle equall to an angle given.

Let in the last Diagram, the Romboides CFLG. be given, and it is required to make a triangle equall thereunto, whose base shall be of the length of the line M. and having one angle equall to the angle N.

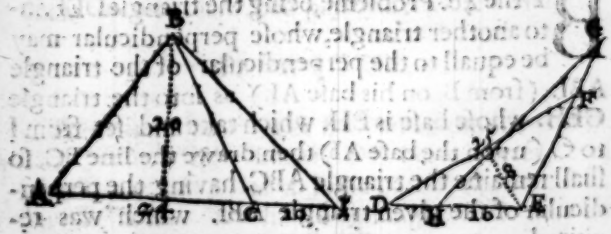
FIrst increase the side C F. to A. then set the line M. from C. to A. for the base, that done, from A. protract an angle equall to the angle N. as the an-
P.7. gle B A C. by drawing the line AB. Then say by the
P.23. 23. Probleme, if the ½ base given the perpendicular (of the Romboides) from L. upon the side CF. what the length CF? answer a line, at the distance whereof drawe a parrell to the base AC. as the pricked line B. to cut AB. in B. Lastly, drawe the line BC. so shall you include the triangle A B C. equall to the Romboides C F L G. and having an angle as the angle B A C. equall to the given angle N. which was required.

PROB. LXXVI.

Prob. LXXVI.

To adde two severall Triangles together, and to make one of them both, whose perpendicular shall be equall to the perpendicular of one of the given Triangles.

Let A B C. and D E F. be two triangles given, and it is required to make one equall to them both, whose perpendicular shall be the perpendicular of the triangle A B C.



BY the 46. Probleme, reduce the triangle D E F. into another triangle whose perpendicular may be equall to the perpendicular of the triangle A B C. (as into the triangle G E H.) that done, increase the base of the triangle A B C, viz. A C, to I 37.1. then take E H. the base of the triangle G E H. and set it from C. to I. Last ly, drawe the line, B I. so shall you include the triangle A B I. which shall be equall to both the triangles A B C, and D E F. together, and having the perpendicular of the triangle A B C. which was required. 1.6.

Prob. LXXVII.

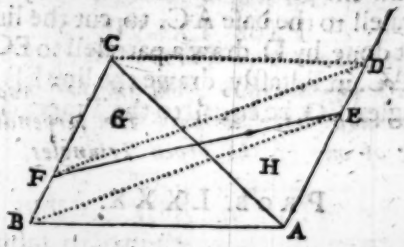
To subſtract one Triangle from another, and to make the Triangle left, to have the perpendicular of one of the given Triangles.

Let in the laſt Diagram ABI. and DEF. be two triangles given, and it is required to ſubſtract the
37.1. triangle DEF. from the triangle ABI. and to make
1.6. the triangle left, to have the perpendicular of the triangle ABI.

BY the 46. Probleme, being the triangle DEF. into another triangle, whoſe perpendicular may be equall to the perpendicular of the triangle ABI. (from B. on his baſe AI.) as into the triangle GEH. whoſe baſe is EH. which take and ſet from I to C. (upon the baſe AI) then drawe the line BC. ſo ſhall remaine the triangle ABC. having the perpendicular of the given triangle ABI. which was required.

Prob. LXXVIII.

There is a triangle as A B C. and from A is drawn a right line as A E D. Now from the point E. in that line, it is required to draw a line through AC. (as EF) in ſuch ſort that the triangle G. cut off, be equall to the triangle H. taken in.



AB 30. p.fró C. 20 from D. 20

FIrſt by C. draw a Parralell to the baſe A B. (as CD.) to cut the line AED. in D. that don, draw the pricked line B E. then from the point D. draw a parralel thereto to cut the ſide CB in F. Laſtly draw the line FE. which performeth the demand. 37. I.

PROB. LXXIX.

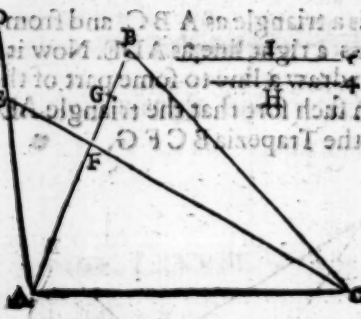
There is a triangle as A B C. and from the end A. there runns a right line, as A D E. Now it is required from E. to draw a line to ſome part of the baſe AC. (as EF.) in ſuch ſort that the triangle AEG. may be equall to the Trapezia B C F G.

AC. 30. p.fró B. 20 AF. 24. p.fró E. 25.

FIrst draw the pricked line E C. then by B. draw a parralell to the baſe A C. to cut the line A E. in D. that done, by D. draw a parralell to EC. to cut the baſe AC. in F. Laſtly, drawe the line EF. ſo ſhall the triangle AEG. be equall to the Trapezia BCFG. required.

PROB. LXXX.

There is a triangle as A B C. and from A. runneth a line as A D. now it is required from the angle C. to draw a line to ſome part of A D. (as C E.) in ſuch ſort that the triangle A F C. cut off, together with the triangle A E F. taken in, (viz the whole triangle G A E.) may have proportion to the triangle given, as the line H. to the line I.



AB. 40
Pfrō C. 45.
AC. 48
P frō E 30
AG 32.
P frō C 45

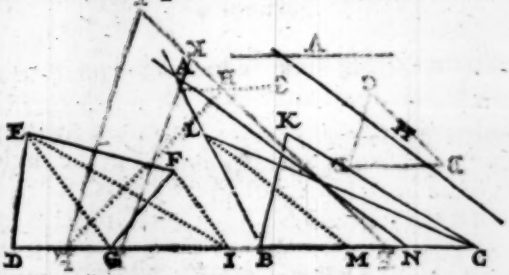
BY the 23. Probleme ſay, if I. give H. what A E? anſwer A G. then by G. draw a Parralell to the baſe A C. to cut the line A D. in E. Laſtly, draw C E. ſo ſhall you include the triangle C A E. which performeth your deſire.

22. 6.
37. 1.

PROB. LXXXI.

Prob. LXXXI.

There is an angle as A B C. from the which it is required to cut off a part, equall to the Trapezia D E F G. with a parralell to the line H.



D I 47
P fr6 E 24
B O 47.
P fr6 K 24
P fr6 L 24
B N 38
P fr6 A 36

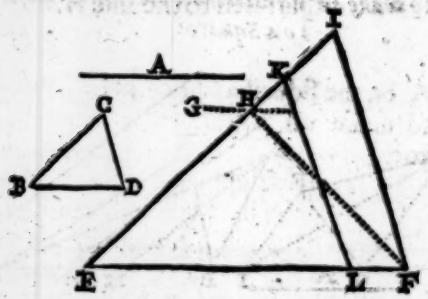
First reduce the Trapezia by the 47. Probleme into the triangle D E I. which triangle set in the angle C B A. beginning at B. as appeareth by the triangle C B K. that done, by the 38. Probleme, reduce the triangle C B K. into the triangle C B L. having the same base C B. but the angle at B. equall to the given angle C B A. that done, by L. draw a parralell to H. the line given, to cut B C. in M. then finde a mean proportion, between B M. and B C. as B N. Lastly, by N. draw a parralell to H. as N A. to cut the side B L A. in A. so shall you cut off from the angle A B C. the triangle A B N. equall to the Trapezia D E F G. with a parralell to the given line H. as was required.

Prob. LXXXII.

A figure being given to make another in Area equall thereunto, but like a figure given.

Let the line A. be the side of some square given, and

*I*et it be required to reduce the ſame into a triangle, li ke the triangle BCD, with all his angles, and ſides pro portionall.



EF. 60. p frõ H. 30. EL. 50. P. frõ K 36

FIrſt lay down t he diſtance of the line A. twiſe from E. to F. then at the diſtance of the line A. draw a parralell to E F. as the pricked line G. That done, from the end E. protract an angle equal to the angle B. (of the given triangle BCD.) as the angle F E H. to cut the parralell G, in H. and draw the pricked line HF. ſo ſhall the triangle EHF. be equall to ỹ ſquare, whoſe ſide is the line A. that done, from the end F. protract an angle equall to the angle D. (of the leſſer triangle) as the angle E F I. to cut EH. being drawn forth in I. ſo ſhall the triangle E F I. be like the lit tle triangle B C D. but more in *Area* then the triangle EHF. (which is equal to the ſquare given) therefore to make one equall thereunto, find a mean proportion between E H. and E I. which is EK. then by K. draw a parralell to I F. as K L. ſo ſhall the triangle EKL. be equal to that ſquare whoſe ſide is the line A. & having all the angles like the angles

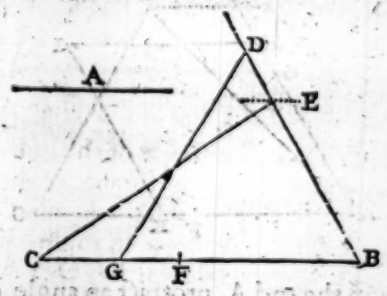
of

of the given triangle B C D. which was required.

Prob. LXXXIII.

To make an Equilaterall triangle, equall to a Square.

Let A. be the side of a square given, and it is required to make an Equilaterall triangle equall thereunto.



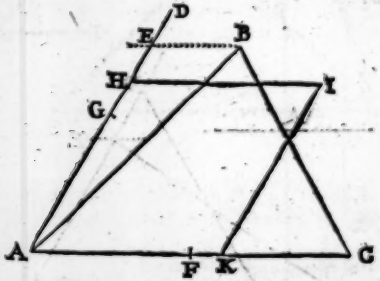
First, draw the line BC. just of twise the length of the given line A. then from the end B. protract an angle equal to the angle of an equilateral triangle, as D B D. that done, at the distance of the line A. drawe a parralell to CB. as the pricked line E. to cut BD. in E. then set that distance BE. from B. to F. Lastly finde a meane proportion betweene BF. and BC. which is BG. which set from B to D. and drawe the line GD. so shall you include the Equilaterall triangle B D G. equall to CBE. or the square given, whose side is A. which was required.

Prob. LXXXIIII.

Prob. LXXXIIII.

To make a Rombus equall to a Triangle given.

Let ABC. be a triangle given, and it is required to make a Rombus equall thereunto.



FIrst from the end A. protract an angle equall to one of the acute angles of the Rombus, which is the angle of an Equilaterall triangle (as the angle CAD.) then by the point B. draw a parralell to the base AC. to cut AD. in E. that done, take alwaies ½ the base AC. (as AF.) and set that upon the line AD. from A. to G. Lastly, betweene AG. and AE. finde a meane Proportion, as AH. (for the side) whereof make the Rombus AHIK. which shall be equall to the given triangle ABC. required.

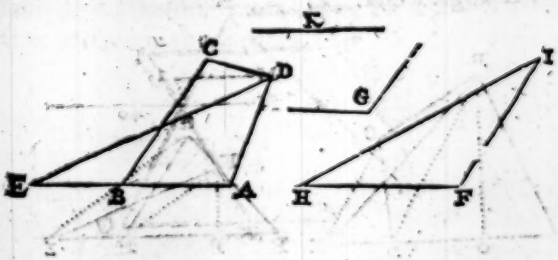
These 4. last Problemes have their demonstration out of the 37. 1. and the cor: of the 19. 6. of Euclid.

Prob. LXXXV.

PROB. LXXXV.

To reduce a Trapezia into a Triangle, whose base is limmited, and yet shall have an angle equall to an angle given.

Let ABCD. be a Trapezia given, and let it be required to make a triangle equall thereunto, whose base shall be the line H F. and having one angle, equall to the angle G.



EA. 48. p. fró D. 25
HF. 40. p. fró I. 30.
K. 30.

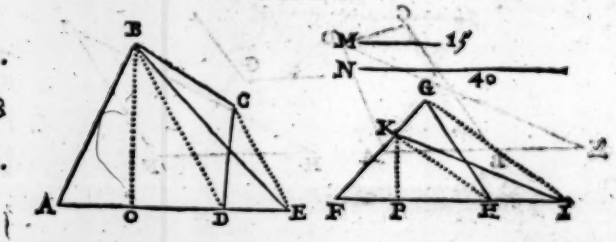
First by the 47. Problem, reduce the Trapezia into the triangle D A E. then from the end F. (of the given line HF.) protract an angle equal to the angle G. as the angle H F I. by drawing the line F I. that done, say by the 23. Probleme, if HF. give EA. what the perpendicular from D. upon the base E A. (being increased?) answer the line K. at which distance, draw a blinde parralell to HF. to cut F I. in I. Lastly, draw H I. so shall you include the triangle H F I. equall to the Trapezia A B C D. and having one angle equall to the given angle G. which was required. 37.1. 23.1. 12.6. 31.1.

Prob. LXXXVI.

Two figures being given, and a right line, to finde another line in proportion, to the line given, as the one figure to the other.

Let ABCD. and FGH. be two figures: alſo, let M. be a line given. Now it is required to finde another line in proportion to M. as the Trapezia ABCD. to the triangle FGH.

AE. 45.
p. BO. 32.
FH. 30.
pſrō G. 18
FI. 45.
p. KP. 12.



BY the 47. Probleme, bring the Trapezia ABCD. into the triangle ABE. whoſe baſe is AE. and let fall his perpendicular BO. Then reduce the triangle FGH. into another triangle, whoſe baſe may be equall to the ſaid baſe AE as into the triangle FKI.
37. 1. & let fall his perpendicular KP. ſo ſhall the triangle
1. 6. FKI. or FGH (becauſe they are equall) be in proportion to the Trapezia as the perpendicular KP. to the
12. 6. perpendicular BO. Now if KP. were equall to the line M. then BO ſhould be the line required, but for as much as it is not, therefore ſay by the 23. Problem, if KP. were the line M. what BO? anſwer the line N. and ſo is found that the line N. hath the ſame proportion

portion to the line M. as the Trapezia ABCD. to the triangle FGH. which was required.

Prob. LXXXVII.

To devide a line given into two such parts, that another line (so it be not above half the given line) may be a mean proportion between the parts.

Let AB. be a line given, to be devided into two such parts, that the line G. may be a mean proportion betweene those parts.

G.12.

VPon the line AB. describe the semi-circle AEB. then at the distance of the line G. drawe a perpendicular to AB. as the pricked line D. to cut the Circomference in E. Lastly, let fall the perpendicular EF, which cutteth AB. into two parts in F. so is AF. and FB. the two parts required.

G. equall to EF. 13.6.

Or thus.

Again, in the same Diagram, let HI. be the line, & let it be so devided, that the line G. may be a mean betweene the two parts.

Devide H.L. in the midst in K. and upon K. erect a perpendicular at length, as KI. that done, set the line G from K. to M. then take $\frac{1}{2}$ HI. viz. HK, or KI. and setting one foot in M. with the other crosse the line HI. in N. so shall IN. be the lesser part, and NH. the greater.

Prob. LXXXVIII.

To reduce a square into a long square, whose length and breath is limmited in a straight line, wherein is to be noted, that the side of that square may not exceed halfe the line given.

Let AB in the last Diagram be a line given, and let G. be the side of some square. Now it is required to make a long square equall to that square whose side is the line G. and yet the length and breadth thereof together shall make but the line AB.

Devide the line AB. as before taught in F. in such sort, that the line G. may be a meane proportion betweene the parts AF. and FB. so shall AF. be the breath and FB. the length, whereof make the long square BFOP. which shall be equall to that square whose side is the line G. and yet the length BF. and the breath FA. together, shall make but the given line AB. as was required.

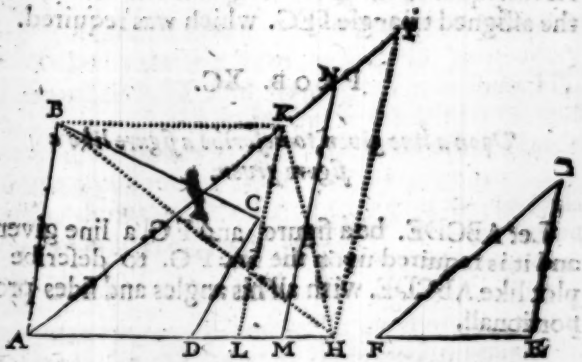
47.1. 13.6.

Prob.

PROB. LXXXIX.

To make a Triangle equall in Area, to a figure given, and yet like a Triangle assigned.

Let ABCD, be a figure given, and it is required to make a triangle equal thereunto, but like the triangle EFG.



AH. 36.
p. fr6 B. 25
p. fr6 K. 25
AL, 25
AM, 30
p fr6 N 30

BY the 47. Problem bring the Trapezia A B C D. into the triangle ABH. then from the end A. protract (by the 7. Problem) an angle, as the angle HAI. equal to the angle F. of the given triangle, by drawing the line A I. Again, from the end H. (of the base A H.) protract an angle equal to the angle E. by drawing the line H I. (as the angle A H I.) so shall you include the triangle A I H. like the given triangle EFG. but not equal to the Trapezia: for it is too big. Therefore from B. draw a parralell to

37. 1.
23. 1.
Cor. 19. 6.

A H. as B K. to cut A I. in K. then draw K H. ſo ſhall the triangle AKH. be equal to the triangle ABH, or the Trapezia ABCD. but that hath not the angle at H. equal to the angle E. of the given triangle: therefore draw by the point K. a parralel to I H. as K L. to cut A H. in L. that done, between A L. and A H. finde a mean proportion which is A M. Laſtly, from the point M. draw a parralel to H I. as M N. to cut the ſide A I. in N. ſo ſhall you include the triangle ANM. equal to the given Trapezia ABCD. and like the aſſigned triangle FEG. which was required.

Prob. XC.

Upon a line given, to deſcribe a figure like a figure given.

Let ABCDE. be a figure, and F G. a line given, and it is required upon the line F G. to deſcribe a plot like ABCDE. with all his angles and ſides proportionall.

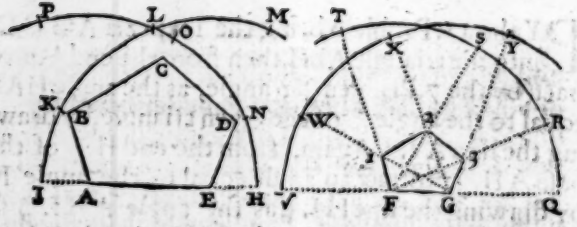


Fig.

FIrſt extend the baſe A E. on both ſides at pleaſure as to H. and to I. then ſetting one foot in E. make the arch IKLM. Set alſo one foot in A. and with the ſame diſtance make the arch HNOP. that done, lay the Rular by the angle A. and every of the points EDCB. and marke the arch H N O P. in the points HNOP. Then lay alſo your Rular by the angle E. and every of the points A.B.C.D. and marke the arch IKLM. in the points IKLM. Then with the diſtance A H. or E I. ſeting one foot in F. make the arch Q R S T. Alſo ſetting one foot in G. with the ſame diſtance make the arch V.W.X.Y. Then lay the Rular by the end F. (of the line FG.) and every of the points R S T. and draw the blinde lines FR. FS. FT. lay alſo the Rular by the other end G. and every of the points W.X.Y. and draw other blinde lines to croſſe thoſe blinde lines in the points 1.2.3. Laſtly, draw the lines F1. 1.2. 2.3. 3.G. ſo ſhall you include the figure F.1.2.3.G. like the figure A B C D E. upon the given line F G. which was required.

And in the ſame manner might you increaſe a plot, by making the line FG. longer, and then work as before.

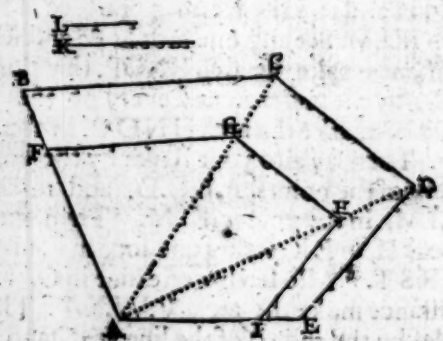
PROB. XCI.

To increaſe or decreaſe a figure given, according to any proportion required.

Let ABCDE. be a plot given, to be made leſſe in proportion, as L. to K.

By

P. 52.



BY the 52. Probleme, devide one of the sides (as AB.) in power as L. to K. in such sort, that the power of AF. may be to the power of AB. as L. to K. Then from the angle A. draw lines to the points C. and D. that done, by F. draw a parralel to BC. to cut AC. in G. (as FG.) Again, from G. draw a parralel to CD. to cut AD. in H. Lastly, from H. draw a parralel to DE. to cut AE. in I. so shall the plot AFGHI. be like ABCDE. and in proportion to it, as the line L. to the line K. which was required.

And if the lesser plot were given, and it be required to make a greater in proportion to it, as K. to L. then from the point A. draw the lines AC. and AD. at length (also increase AF. and AI.) that done, by the 53. Probleme, inlarge AF. in power, as K. to L. which set from A. to B. then by B. draw a Parralel to FG. to cut AC. in C. (as BC.) Likewise from C. a parralel to GH. to cut AD. in D. (as CD.) Lastly, a parralel from D. to HI. (as DE.) to cut AI. (being increast in E.) so shall you include the plot ABCDE.

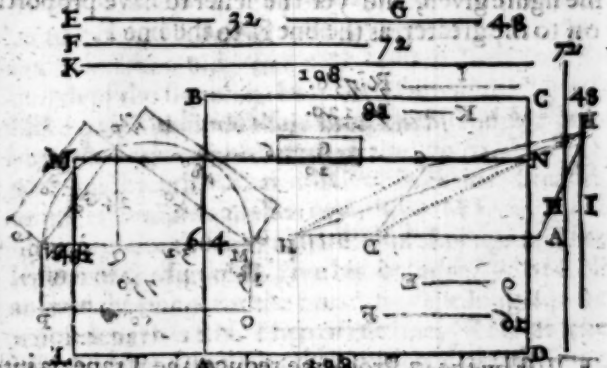
like

like AFGHI. and in proportion thereunto as the line K. to the line L. which was required.

Prob. XCII.

To reduce a long ſquare into another long ſquare, whoſe breadth ſhall have proportion to his length, as one given line to another.

Let ABCD. be a long ſquare given, to be reduced into another long ſquare whoſe breadth ſhall have proportion to his length, as the line E. to the line F.



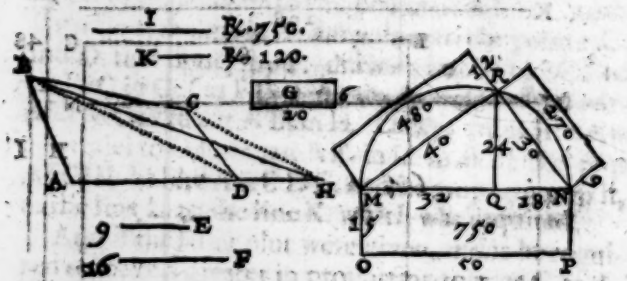
FIrſt by the 26. Probleme, finde a mean proportion between the given lines E. and F. which is G. finde alſo a mean between the breath AB. and the length BC. which is H. That done, ſay by the 23. Probleme, if G. give H. what F? anſwer the line K. for the length: Say again, by the ſame rule, if G. 13 12 14 } 6.

give H. what E. answer the line I. for the breadth: then of the lines I.K. made by the 14. Probleme, LMND. which shal be equal to the given long squate ABCD. and yet the breadth to the length in proportion as the line E. to the line F. which was required.

PROB. XCIII.

A figure being given, to make two other figures equall to it, but each of those two, like another figure given, and yet the lesser to the greater in proportion as one given line to another.

Let ABCD. be a Trapezia given, and it is required to make two other figures each to be like the figure G. & yet both together in *Area* equall to ABCD. the figure given, and yet the lesser to have proportion to the greater, as the line E. to the line F.



FIrst by the 47. Probleme, reduce the Trapezia into the triangle ABH. then that triangle by the 43. Probleme into a square, whose side will be the line I. that done, by the 40. Probleme reduce the figure G. also into a square, whose side shall be the line K. Then reduce the given Trapezia ABCD. into a long square like G. after this manner. Say by the 29. Probleme, if

K. give

K. give I. what the longer ſide of the figure G? anſwer the line MN. for the length, ſay again, if K give I. what the breadth, of the ſaid figure G? anſwer MO. for the breath, whereof by the 14. Probleme, make the long ſquare MNPO. which ſhall be equall to the Trapezia ABCD. and like G. the figure given. Then for as much, as the figures to be made like G. are to have proportion together as E to F. therefore by the 24. probleme, devide the length of the long ſquare MNOP. equall to the Trapezia given, viz. MN. in Q into two parts in proportion as E. to F. viz. that as E. to F. ſo NQ. the leſſer part to QM. the greater. That done, upon the line MN. deſcribe the ſemicircle MRN. and upon the point Q. erect a perpendicular to cut the limbde or Circumference in R. then draw the lines NR. and MR. which ſhall be the length of the figures to be made. Unto which length MR. and RN. finde their breadths by the 13. probleme thus, ſay if the length of the given figure G. give his breath, what MR? anſwer his breadth which is the line 12. then of the line MR. and the line 12. make the long ſquare 480. Say again, if the length of the figure G. give his breadth, what RN? anſwer the line 9. for the breadth of the long ſquare whoſe length is RN. Then of the lines RN. as the length and the line 9. as the breadth, make the long ſquare 270. which two long ſquares, viz. 480. and 270. are both like the given figure G. and together contain in *Area*, ſo much as the given Trapezia ABCD. and yet the leſſer figure 270. is in proportion to the greater 480. as the line E. to the line F. which was required.

31.3.
31.6.
8.6.
4.6.
Cor. 19 6.

Now follows a Compleat Instruction

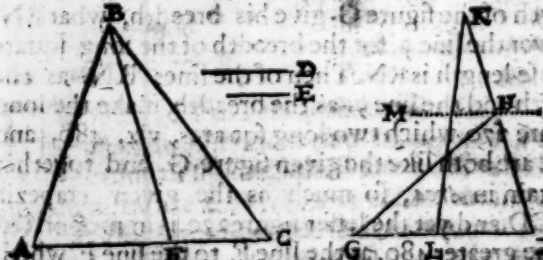
of the devision of all right lined figures, in divers kindes, being performed after a better way than by any former Writer.

Very pleasant, and full of delight in practice: Also, most profitable to all Surveighers, or others that are desirous to make any Inclosure.

PROB. XCIIII.

To devide a Triangle according to a proportion assigned, with a line drawn from an angle given.

Let ABC. be a triangle given, to be devided into two parts in proportion one to the other, as the line D. to the line E.



By

By the 24. Probleme, devide the base A C. in F. as D. to E. then draw the line B F. so shall you devide the triangle into two parts, as D. to E. required, for as D. to E. so the triangle ABF. to the triangle BCF, &c. P. 24. 1. 6.

Prob. XCV.

To cut off from a triangle, a part equall to a figure given, and to lay the part cut off towards any place appointed.

Let in the last Diagram ABC. be a triangle given, from the which it is required to cut off so much as the triangle G H I. containeth, and to lay the part cut off next C.

Increase the side I H. at length, then by the 46. Problem, to reduce the triangle GHI. into the triangle K I L. whose perpendicular may be of the length of the perpendicular of the given triangle ABC. from B. upon his base A C. That done, take the base IL. and set it from C. to F. (because it is required to lay the part cut off next C.) Lastly, draw BF. so shall the triangle BCF. be cut off, lying next C. and be equal to the given triangle G H I. which was required.

Hence also may be gathered, how to cut off from a figure given, any number of Acres, Roods Poles, &c. and to lay them towards a place appointed. For suppose $\frac{A}{1}\ \frac{R}{1}\ \frac{P}{11}$ were to be cut off, and to be laid next C.

First, make any triangle at pleasure, that may contain $\frac{A}{1}\frac{R}{1}\frac{P}{10}$ being made by the same scale whereby the triangle ABC. was laid down. As let the triangle GHI. contain $\frac{A}{1}\frac{R}{1}\frac{P}{}$ and then as before taught, cut off from the triangle given, ABC. a part equall to the triangle GHI. as BFC. and lay it next C. so shall you cut off $\frac{A}{1}\frac{R}{1}\frac{P}{20}$ which was required. The like is to be understood in all the examples following.

But here it will be necessary to shew the learner how to make a triangle to contain a number of Acres, Roods, Poles, &c.

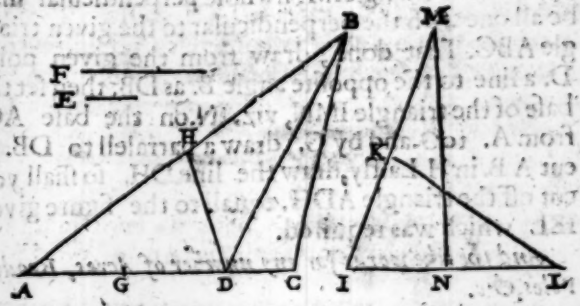
As now to make the triangle GHI. to contain $\frac{A}{1}\frac{R}{1}\frac{P}{20}$. *Therefore proceed thus: Bring the 3. Acres, and 1. Rood into Roods, by multiplying the 3. Acres by 4. and adding in the 1. rood, saying 4. times 3. is 12. and 1. is 13. so doth 3. Acres & 1. rood contain 13. rood: Which 13. bring into Poles by multiplying them by 40. and adde in the 20. Pole (because 40. Pole make one rood) so finde you 540. Poles to be contained in* $\frac{A}{1}\frac{R}{1}\frac{P}{10}$. *Now are you to make some kind of triangle to contain 540. poles which is thus done, double alwaies your number of poles, viz. now 540. maketh 1080. then take for the base of your triangle any number at pleasure, as 40. by which devide 1080. the double of the poles to be brought into a triangle, & your quotient is 27. which shall be the perpendicular, to that triangle whose content shall be* $\frac{A}{1}\frac{R}{1}\frac{P}{}$ *& the base 40. as before. Therefore lay down the base 40. any where, as in the former Diagram, from G. to I. then at the distance of 27. your quotient, draw a parralel thereunto as the pricked line MH. that done, take any point in that parralel, as the point H. from whence draw lines to G. & I. the ends of the base, as GH. & HI. so shall you include the triangle GHI. which shall contain* $\frac{A}{1}\frac{R}{1}\frac{P}{20}$ *as was required.*

PROB.

Prob. XCVI.

To devide a triangle given into two parts in proportion according to two lines given, with a line draw from a point in any side assigned.

Let ABC. be a triangle given, and let D. be a point assigned in the side AC. from whence it is required to draw a line to devide the triangle into 2. parts, having proportion one to the other, as the lines E. and F.



First devide the line or base AC. in G. as E. to F. by the 24. probleme, then draw from the opposite angle B. a line to the given point D. as BD. that done, by the point G. draw a parralell thereunto to cut the side AB. in H. Lastly, draw the line DH. so shall you inclose the triangle A D H. which shall be in proportion to the rest DCBH. as the line E. to the line F. which was required. 1.6. 37.1.

Prob. XCVII

Prob. XCVII.

To cut off from a triangle given, a part equall to a figure given with a line drawne from a point in any side assigned.

Let in the last Diagram ABC. be a triangle given, and let D. be a point assigned, in the side AC. from whence it is required to draw a line to some part of the side A B. as DH. to inclose a part equall to the triangle IKL.

First, by the 46. probleme, bring the triangle IKL. into the triangle IMN. whose perpendicular may be all one with the perpendicular to the given triangle ABC. That done, draw from the given point D. a line to the opposite angle B. as DB. then set the base of the triangle IMN, viz. IN. on the base AC. from A. to G. and by G. draw a parralell to DB. to cut A B. in H. Lastly, draw the line DH. so shall you cut off the triangle ADH. equall to the figure given IKL which was required.

P. 24. 37. 1. 1. 6.

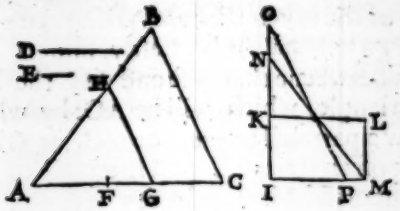
And the like worke for any number of Acres, Roodes, Poles, &c.

Prob. XCVIII.

To devide a triangle given, according to a proportion assigned with a parralell to one of his sides.

Let ABC. be a triangle given, and it is required to devide it into two parts in proportion one to the other, as the line D. to the line E. with a parralell to the side BC.

Devide



DEvide the baſe AC. in F. as D. to E. that as D. to E. ſo CF. may be to FA. then finde a mean proportion by the 26. Probleme, between AF, and AC. which. is AG. Laſtly, by G. draw a parralell to the ſide CB. as GH. ſo ſhall you cut off the triangle AGH. having proportion to the reſt BCGH. as E. to D. which was required. 10.6. 13.6. Cor. 19. 6.

PROB. XCIX.

To cut off from a triangle, a part equall to a figure given, with a parralell to one of his ſides.

LEt in the laſt Diagram ABC. be a triangle given, from the which it is required, to cut off ſo much as the long ſquare IKLM. with a parralell to the ſide BC.

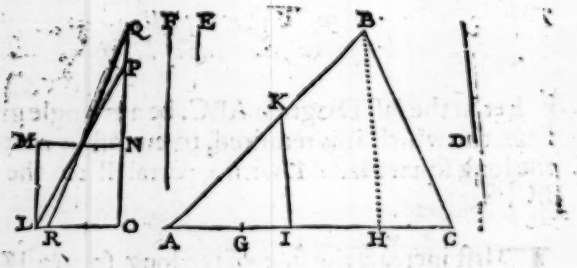
FIrſt increaſe the ſide of the long ſquare IK. at length to O. then ſet twiſe the breadth from I. to N, and draw the line NM. ſo ſhall you include the triangle NIM. equall to the long ſquare given, which triangle reduce againe into a triangle,

whoſe perpendicular may be equall to the perpendicular of the given triangle ABC. as into the triangle IOP. whoſe baſe is IP. Laſtly, finde a mean proportion betweene that baſe and AC. the baſe of the given triangle, which will be AG. by which point G. draw a parralell to the ſide BC. as GH. ſo ſhall you cut off the triangle AGH. equall to the given long ſquare IKLM. required.

PROB. C.

To devide a triangle (with a parralell to aline given) according to any proportion aſſigned between two lines.

Let ABC. be a triangle, and D. a line given, and it is required to devide the ſame into two parts with a parralell to D. in proportion one to the other, as the line E to the line F.



BY the 24. Probleme devide the baſe AC. in G. as E. to F. then by B. draw a parralell to the line D. as the pricked line BH. to cut AC. in H. That done

done, between AG. and AH. finde a mean proportion, as AI. then by the point I. draw a parralel to the given line D. as IK. so is cut off the triangle AIK. which shall be in proportion to the rest CBKI. as E. to F. which was required. p.24. 1.6. Cor.19.6.

PROB. XCI.

To cut off from a triangle, a part equall to a figure given, with a parralell to a line assigned.

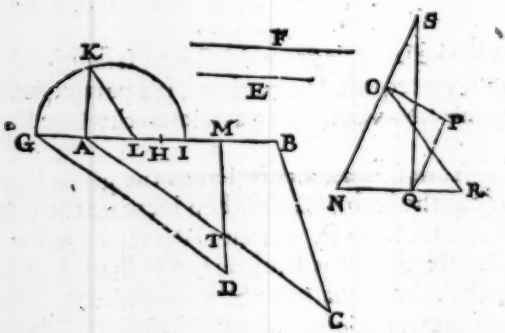
Let in the last Diagram ABC. be a triangle given, and let it be required to cut from it a part equall to the square LMNO. with a parralel to the line D.

FIrst from B. draw a parralell to the given line D. to cut the base AC. in H. then increase the side of the square ON. to P. so that OP. may be just twice the side ON. and draw the line LP. so shall the triangle LOP. be equall to the square given. Then reduce that triangle into the triangle OQR. whose perpendicular OQ. may be equall to the perpendicular of the triangle ABC. that done, take the base thereof, *viz.* OR. and set that upon the base AC. (of the given triangle) from A. to G. then finde a mean proportion between AG. and AH. as AI. and by the point I. draw a parralell to the line D. as IK. which shall cut off the triangle AIK. equall to the square given, as was required. 37.1. p.24. 1.6. Cor.19.6.

Prob. CII.

To devide a triangle into two parts, according to any proportion given, with a line drawn from a point assigned without the triangle.

Let ABC. be a triangle given, and D. a point without, from whence it is required to draw a line to devide the triangle into two parts in proportion one to the other, as the line E. to the line F.



12.6. 13.6. 47.1. 26.6. First increase the side AB. to G. Then by the point D. draw a parralel to CA. as DG. to cut BA. being increased in G. that done, devide AB. in H. as E. to F. that as E. to F. so AH. to HB. then, by the 23. Probleme say, if GD. give AC. what AH? answer AI. which set from A. to I. that done, finde a mean proportion between GA. and AI. as AK. then devide alwaies AI. into two equall parts in L. and

and draw KL. which ſet from L. to M. Laſtly, from the point D. to the point M. draw the line DM. ſo ſhall you cut off the triangle AMT. which ſhall be in proportion to the reſt C B M T. as the line E. to the line F. which was reqnired.

Prob. CIII.

To cut off from a triangle a part equall to a figure given, with a line drawn from a point aſſigned without the triangle.

Let in the laſt Diagram ABC. be a triangle given, and D. a point without, from which it is required to draw a line to cut off from the triangle ABC. a part equal to the Trapezia N O P Q.

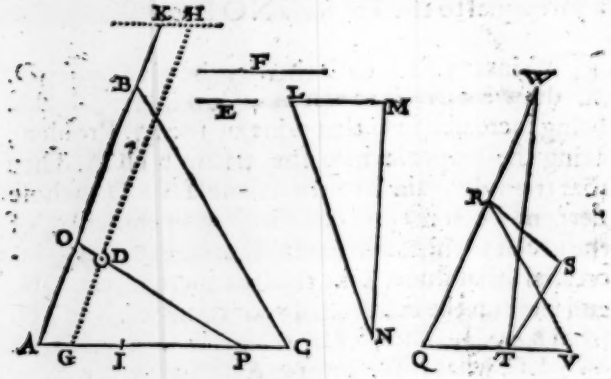
Firſt increaſe BA. to G. then by the given point D. draw a parralel to CA. as DG. to meet with BA. being increaſed in G. that done, by the 47. Problem, bring the Trapezia into the triangle NOR. Then 37.1.
that triangle again into the triangle N S Q. whoſe 12.6.
perpendicular may be equal to ỹ perpendicular of 13.6.
the given triangle ABC. from C. upon AB. (being in- 47.6.
creaſed) that done, take the baſe thereof, *viz.* QN. 16.6.
and ſet it on the baſe AB. (of your triangle given) *viz.* from A. to H. Then ſay by the 23. Probleme, if GD. give A C. what A H? anſwer AI. which ſet from A. to I. that done, finde a mean proportion between AG. and AI. as A K. and devide alwaies the line A I. into two equall parts in L. then draw KL. which ſet from L. to M. Laſtly, from the given point D. to M.

draw the line D M. which cutteth off the triangle A T M. equall to N O P Q. the Trapezia given, as was required.

Prob. CIIII.

Through a given point within a triangle, to draw a line to devide the triangle according to any (possible proportion) between two lines given.

Let ABC. be a triangle given, and D. a point within, through the which it is required to draw a line to devide the triangle into two parts in proportion one to the other, as the line E. to the line F.



First consider through which sides the line of partition O P. must passe, which will be A B. and A C. then by the point D. draw a parralell to A B. as

as GH. to cut the baſe AC. in G. that done, by the 24. probleme, devide the baſe AC. in I. as E. to F. Then ſay by the 23. probleme, If AG. (that part of the baſe cut by the parralell HG. adjoyning to that ſide, unto which the parrelell was drawn, viz. AB.) give the $\frac{1}{2}$ perpendicular from B. upon the baſe AC. what Anſwer, a line, at the diſtance whereof, draw a parralell to the baſe AC. as the pricked line KH. to cut the ſide AB. if it may, if not, increaſe it till it meet with that parralell in K. Then note where the two parrelells viz. GH. and KH. meet, which is in the point H. That done, take by the 55. probleme, the ſquare of GD. from the ſquare of DH. reſt in the right angled triangle LMN. the ſquare of MN which take, and ſet upon the ſide AB. being increaſed from K. to O. Laſtly, lay your Rular by the points O. and D. and draw the line ODP. ſo ſhall you cut off the triangle AOP. which ſhall have proportion to the part remaining OBCP. as the line E. to the line F. which was required. 29.1 26.1 4.6 31.6.

Prob. CV.

To cut off from a triangle with a line drawne through a point within, (if it be poſſible) a part equall to a figure given.

Let ABC. in the laſt diagram, be a triangle given, from whence it is required to cut off ſo much as the figure QRST. with a line drawne through the point D. within.

Firſt,

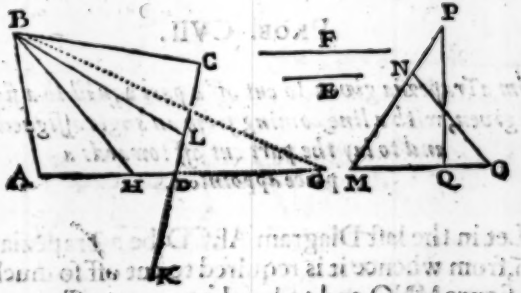
FIrſt bring the figure given into a triangle by the 47. Probleme, as into the triangle QRV. then, that triangle into the triangle QTW. whoſe perpendicular from W. may be equall to the perpendicular from B. upon the baſe AC. of the given triangle, ſo is the baſe of that triangle QTW. the line QT, then ſeeing ſo much as the triangle QTW. is to be cut off with a line drawn through the point D. therefore conſider through which ſides of the triangle A B C. the line of partition OP. ſhall paſſe, which will be the ſides AB. and AC. therefore by D. draw a parralell to AB. as GH. that done, ſet the baſe of the triangle QTW. (equall to your figure given to be cut off) from A. to I. (upon the baſe AC.) Then
37.1. ſay by the 23. Probleme, if AG. (the part of the baſe
29.1. cut by the parralell HG. adjoyning to the ſide AB.
26.1. whereunto that parralell was drawn) give the $\frac{1}{2}$
4.6. perpendicular from B. upon AC. what AI? anſwer a
31.6. line, at the diſtance whereof, drawe a parralell to the baſe AC. as the pricked line KH. to cut the ſide AB. if it may, and if not, increaſe it till it do meet with that parralell, then note where thoſe two parralels meet, viz. GH. and KH. which is in H. that done, take the ſquare of GD. from the ſquare of DH. ſo reſt the line MN. (in the right angled triangle LMN) for the ſide of a ſquare equall to the remainder, which line MN. take, and ſet from K. to O. upon the ſide AB. being increaſt. Laſtly, lay your Rular by the points OD and draw the line ODP. which cutteth off the triangle AOP. equall to QRST. the figure given, which was required.

PROB. CVI.

PROB. CVI.

To devide a Trapezia given, according to any proportion between two lines, with a line drawn from an angle assigned, and to lay the part cut off towards a place appointed.

Let ABCD. be a Trapezia given, the which is to be devided into two parts, as E. to F. with a line drawn from the angle B. and to lay the lesser part next A.



REduce the Trapezia into the triangle ABG. by the 47. probleme, whose base is the line A G. being increased to G. which A G. by the 24. probleme, devide in H. as E. to F. then draw the line BH. so shall you cut off the triangle A B H. which shall be in proportion to the part remaining BGDH. as the line E. to the line F. as was required. 37.1. 10.6. 1.6.

But if the greater part were required to be left towards A. then the line of partition drawn from B. will light upon the side CD. and then must you re-

duce your Trapezia into a triangle, making C D (increaſed the baſe) therefore by the 47. Probleme, finde the point K. ſo is CK the whole baſe, then devide CK in L. as E. to F. by the 24. problem and draw the line BL. ſo ſhall BCL. the leſſer part, lye next C. and BADL. the greater next A. and be in proportion one to the other, as E. to F. which was required.

And if it were to draw a line from the angle C. then the ſide BA. muſt have been increaſed, and the Trapezia brought into a triangle by the 47. problem whoſe baſe muſt be the ſide BA. increaſed, and then work as before taught.

Prob. CVII.

From a Trapezia given, to cut off a part equall to a figure given, with a line coming from an angle aſſigned and to lay the part cut off towards a place appointed.

Let in the laſt Diagram ABCD. be a Trapezia given, from whence it is required to cut off ſo much as the figure MNO. and to lay the part cut off next A.

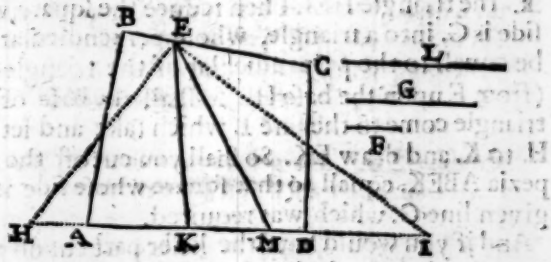
BY the 46. probleme, reduce the triangle MNO. into the triangle M P Q. whoſe perpendicular may be equal to the perpendicular of the triangle ABG. (from B. upon the baſe AG.) then take the
37.1. baſe of that triangle, *viz.* QM. and ſet it from A. to H.
1.6. and draw the line BH. ſo ſhall the triangle A B H. be cut off with a line drawn from the angle B. and be laid next A. whoſe content ſhall be equall to the given figure MNO. which was required.

Prob.

Prob. CVIII.

To devide a Trapezia into two parts, according to any proportion required, with a line drawn from a point, assigned in any of his sides.

Let ABCD be a Trapezia given, and let E. be a point assigned in the side B C. from the which it is required to draw a line that shall devide the Trapezia into two parts, as F. to G.



FIrst increase the base both waies to H. and to I. then from the point E. by the 47. probleme, draw the lines E H. and E I. and bring the Trapezia into the triangle HEI. whose base shall be H I. the which devide in K. by the 24. probleme, as F. to G. Lastly, draw the line EK. so shall you devide the given Trapezia ABCD. with a line drawn from the point E. into two parts, *viz.* ABEK. and ECDK. in proportion one to the other, as the line E. to the line F, which was required. 37.1. 10.6. 1.6.

PROB. CIX.

To cut off from the trapezia, with a line drawne from a point in any of his sides, a part equall to a figure given.

Let in the last Diagram ABCD. be a Trapezia given, from whence it is required to cut off so much as a square made of the line G. containeth.

First, by the 47. probleme, bring the Trapezia into the triangle HEI. Then reduce the square, whose side is G. into a triangle, whose perpendicular may
37.1. be equall to the perpendicular of the triangle HEI.
10.6. (from E upon the base HI.) so shall the base of that
1.6. triangle come to the line L. which take and set from H. to K. and draw EK. So shall you cut off the Trapezia ABEK. equall to that square whose side is the given line G. which was required.

And if you would have the lesser part cut off to be next D. then set the line L. from I. to M. and draw EM. so shall you cut off the part ECDM. next D. which shall be in proportion to the rest ABEM. as F. to G. required.

Yet must I herein advise you one thing, that if you intend to lay the part cut off next A. that then there is no necessity to reduce the whole Trapezia into a triangle, as to make the triangle HEI. but it may suffice to draw the line EH. by the 48. probleme, to take in so much as it cuts off, and then reduce your figure given to be cut off, into such a triangle whose perpendicular may be equall to the perpendicular from E.

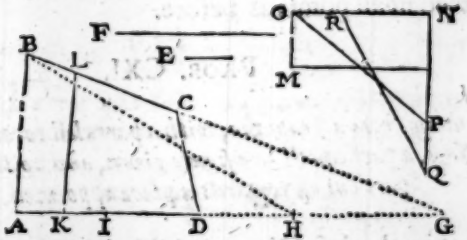
from E. upon AD. and then the base of that reduced triangle being set from H. to K and the line EK. being drawn, it performeth the demand.

But this may be onely done, when a figure given, or a summe of Acres is required to be cut off, but not when it is required, to devide the plot into two parts in proportion to two lines given, as the 108. problem requires, for then it is of necessity to bring the whole Trapezia into a triangle, &c.

Prob. CX.

To devide a Trapezia given, into two parts, with a parralell to one of his sides, in such proportion one to the other, as two lines given, and to lay the part required towards a place assigned

Let ABCD. be a Trapezia given, to be devided into two parts, with a parralell to the side AB. In such sort, as the lesser part may have proportion to the greater, as the line E. to the line F. and to lay the bigger part next D. and the lesser next A.



FIrſt, conſider through which two ſides the line of partition K L. muſt paſſe, (for thoſe two ſides muſt alwayes be increaſed till they meet) which ſides are A D. and B C. which increaſe till they meet in G. That done, by the 47. Probleme, reduce the Trapezia ABCD. into the triangle ABH. whoſe baſe is AH. or which is better, having found the point H. it ſuffiſeth: and there is no need to draw the line BH. for it doth but obſcure and darken the work, and is better out then in, well then, having the point H. The baſe of that triangle equall to the Trapezia ſhall be AH. which devide by the 24. Probleme in I. as E. to F. viz. that as E. to F. ſo AI. the leſſer part next A. (becauſe the leſſer part is to be laid next A.) to IH. the greater part. That done, between GI. and GA. finde a mean proportion, as GK. Laſtly, by the point K. draw a parralell to the ſide AB. as KL. ſo ſhall you cut off the leſſer part ABLK. (next A.) which ſhall have proportion to the greater part KLCD. next D. as the line E. to the line F. as was required.

37.1.
10.6.
1. 6.
13.6

But if the part required to be cut off, had been with a parralell to A D. then the line of partition would paſſe through the ſides AB. and DC. which muſt have been increaſed till they meet, and then proceed in all points as before.

PROB. CXI.

To cut off from a Trapezia, with a parralell to one of his ſides, a part equall to a figure given, and to lay the part cut off towards a place appointed.

Let in the laſt Diagram MN. be a long ſquare given

given to be cut off, from the Trapezia ABCD. with a parralell to the fide AB. and to lay the part cut off next A.

FIrſt as before, conſider through which ſides the line of partition ſhall paſſe, which are BC. and AD. which increaſe till they meet in G. That done, reduce the long ſquare MN. into the triangle ONP. and that triangle again into the triangle RNQ. (whoſe perpendicular NQ. may be equal to the perpendicular from B. upon A H.) ſo ſhall his baſe be the line NR. which take, and ſet from A. to I. (becauſe it is to be laid next A.) That done, between GI. and GA. find a mean proportion as GK. Laſtly, from K. draw a parralell to the ſide AB. as KL. ſo ſhall you cut off the part ABLK. equall to MN. the long ſquare given, which was required. 37.1 13.6 1.6

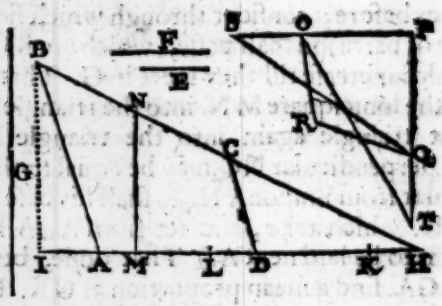
And if the part cut off equall to the long ſquare MN. ſhould have been laid next D. then you muſt firſt have found the point H. and then have ſet the diſtance NR. from H. towards A. and ſo have proceeded as before, but ſeeing it is to lye next A. there is no need at all to finde the point H. but onely proceed as before taught, &c.

PROB. CXII.

To devide a trapezia into two parts, according to any proportion between two lines, with a parralel to a line given, and to lay the part required towards a place aſſigned.

Let ABCD. be a Trapezia given, to be devided into

into two parts in proportion one to the other, as the line E. to the line F. with a parralell to the line G. and to lay the greater part next D.



FIrſt, conſider through which ſides the line of partition ſhall paſſe, which will be the ſides AD. and BC. which increaſe till they meet in H. then by B. draw a parralell to the given line G. as BI. to meet with the baſe D A. (being increaſed) in I. that
37.1. done, by the 47. probleme, finde the point K. unto
10.6. which point a line drawn from B. ſhould include a
1.6. triangle equall to the Trapezia given, ſo is AK. the
Cor.19.6. whole baſe of that triangle, which devide in L. as E. to F. and lay the bigger part KL. next D. (becauſe it is ſo required) that done, between HL. and HI. finde a mean proportion, as HM. Laſtly, by the point M. draw a parralell to the given line G. as MN. ſo ſhall you devide the Trapezia A B C D. into two parts, with a parralel to the line G. and lay the bigger part DCNM. next D. and the leſſer part MNBA. next A. as was required.

PROB. CXIII.

PROB. CXIII.

To cut off from a Trapezia a part equall to a figure given, with a parralell to a line drawne by chance, and to lay the part cut off towards a place assigned.

Let in the last Diagram ABCD. be a Trapezia given, from whence it is required, to cut off so much as the figure OPQR. with a parralell to the line G, and to lay the part cut off next A.

FIrst consider, through which sides MN. the line of partition shall passe, which are AD. and BC. which increase till they meet in H. that done, reduce OPQR. your figure given to be cut off, into the triangle QPS. by the 47. Probleme, & again that triangle into the triangle OPT. by the 46. probleme, whose perpendicular PT. may be equall to the perpendicular from B. upon HA. (being increased) so shall his base be PO. which take and set 37.1.
upon the base AK. from A. towards K. (because the 1.6.
part cut off must lye next A.) endeth in L. then draw from B. a parralell to the given line G. to cut the base HA. (being increased) in I. as the pricked line BI. That done, finde a mean proportion between HL and HI. as HM. Lastly, by M. draw a parralell to the given line G. as MN. so shall you cut off next A. the part ABNM. equall to the given figure OPQR. required.

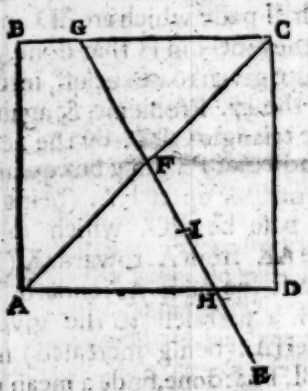
Note, that what hath been said of a Trapezia, conferning the division, according to any proportion between two lines, or cutting off a part equall to a figure given,

either with a line drawne from any angle, from a point in one of the sides, or with a parralel to a line given, that the same may also be done to a square, long square, Rombus, or Romboides, being likewise figures of foure sides, &c.

Prob. CXIIII.

To devide a square into two equall parts, with a line drawne from a point without the square.

Let A B C D. be a square given, and let E. be a point without, from whence it is required to draw a line, which shall devide the square into two equall parts.



First, draw the Diagonall A C. which devide
15. 1. in the midst in F. then laying your Rular by the
29. 1. points E. and F. draw the line EHIFG. which shall
26. 1. devide the square into two equall parts, viz. ABGH and GCDH. both equall one to the other, with a line

line drawn from the point E. as was required.

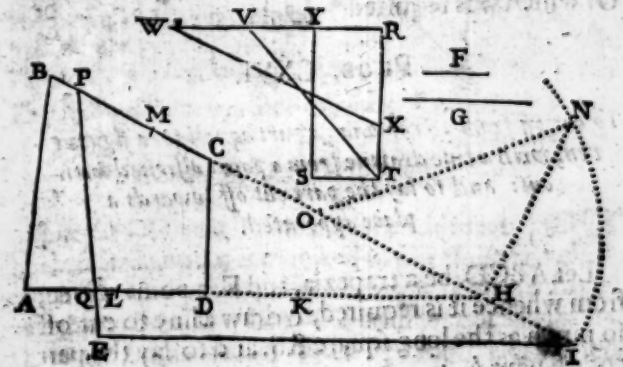
Note alſo, that if the point had been in the ſide, or within the ſquare, as in H. or I. that it is done in the ſame manner.

The like may be done to a long ſquare, a Rombus, or a Romboider.

PROB. CXV.

To devide a Trapezia according to any proportion given with a line drawn from a point without the Trapezia, and to lay the part deſired, towards a place appointed.

Let ABCD. be a Trapezia given, and let E. be a point without, from whence a line is to be drawn, to devide the Trapezia into two parts, ſo that the leſſer part may have proportion to the bigger, as the line F. to the line G. and to lay the leſſer part next A.



FOr as much as the line must be drawn from the point E. it must passe through the sides AD. and BC. therefore increase them till they meet in H: then by the point E. draw a parrelell to AH. as EI. to meet with BH. being drawn forth in I. that done, finde the point K. by the 47. probleme, so is AK. the base of a triangle, equall to the Trapezia, and the shortest distance from B. to AH. the perpendicular then devide AK. in L. as F. to G. (and because the lesser part cut off, is to lye next A. therefore set the lesser part of the base so devided from A. to L. That done, say by the 23. probleme, if IE. give HL. what HB? answer HM. then finde a mean proportion between IH. and HM. as HN. that done, devide alwaies HM. into two equall parts in O. and draw the line ON. which set from O. to P. Lastly, from the point E. to the point P. draw the line EP. so shall you devide the Trapezia into two parts, and the lesser part ABPQ. to lye next A. and so have proportion to the greater part PCDQ. as the line F. to the line G. which was required.

10.6.
13.6
47.1.
16.6.

PROB. CXVI.

To cut off from a Trapezia, a part equall to a figure given, with a line drawne from a point assigned without: and to lay the part cut off towards a place appointed.

Let ABCD. be a trapezia, and E. a point given, from whence it is required, to draw a line to cut off so much as the long square RS. and to lay the part cut off next A.

First

FIrſt conſider, through what ſides of the Trapezia, the line of partition EQP. muſt paſſe, which may eaſily appear to be the ſides AD. and BC. the which increaſe till they meet in H. That done by the point E. draw a parallell to AH. to cut BC. being drawn forth in I. as before, then bring your long ſquare given to be cut off into the triangle TRV. & againe that triangle into the triangle RWX. whoſe perpendicular WR. may be equall to the perpendicular from B. (in the Trapezia) upon the baſe AD. In which triangle WRX. the ſide RX. is the baſe, and RW. the perpendicular, which baſe take, and ſet from A. to L. upon the baſe AD. (becauſe the part cut off is required to be laid next A.) then ſay by the 12. probleme, if LE. give HL. what HE? anſwer HM. and then to finde the point P. proceed altogether, as in the laſt probleme was taught, for there is no difference in the worke, then draw EP. ſo ſhall you cut off the part ABPQ. equall to the given long ſquare RTSY. with a line drawne from the point E. as was required.

37.1
13.6
47.1
16.6

PROB. CXVII.

To devide a Trapezia into two parts, (according to any poſſible proportion given) with a line drawne through a point within.

LEt ABCD. be a Trapezia given, alſo let E. be a point within, and it is required to devide the Trapezia into two parts in proportion one to the other, as the line F. to the line G. with a line paſſing through the point E. within.

FIrſt conſider through which two ſides the line of partition PEQ. muſt paſſe, which will be the ſides AD. and BC. therefore increaſe them till they meet in H. that done, find the baſe of a triangle equall to the Trapezia given, whoſe perpendicular may be the perpendicular from B. upon AD, by the 47. probleme, which baſe will be AI. which devide in K. according to your lines given, viz. that as F. to G. ſo IK. to KA. then by the point E. draw a parralell to AD. as LM. that done, let fall a perpendicular from E. to AD. or take the ſhorteſt diſtance from E. to AD. then ſay, by the 23. probleme, if that perpendicular or diſtance give the perpendicular from B. upon AD. what the ½ of HK? anſwer HN. which ſet from H. to N. by the which point N. draw a parralell to HB. as NM. to cut LM. in M. then take the ſquare of EL. from the ſquare of EM. by the 55. prob. the reſt (which in the right angled triangle TRS) is RS. ſet from N. to P. then by P. and the point E. draw the line PEQ. ſo ſhall you devide the Trapezia into two parts, with a line drawn through the point E. viz. QCDP. the leſſer, and QBAP. the bigger part, and in ſuch ſort, that the leſſer ſhall have proportion to the bigger, as E. to F. which was required.

37. 1.
10. 6.
12. 6.
47. 1.
31. 6.

PROB. CXVIII.

Prob. CXVIII.

To cut off from a Trapezia, with a line drawn through a given point within. (a possible part) equall to a figure given

Let in the last Diagram ABCD. be a Trapezia, and E. a point given, and it is required to draw a line through the point E. which shall cut off a part equal to the square, whose side is the line X.

First increase the sides through which the line of partition must passe, till they meet in H. then by the 47. probleme, finde the base of a triangle equall to the Trapezia given, which will be AI. that done, reduce the square, whose side is the line X. into a triangle, whose perpendicular may be equal to the perpendicular from B. upon AD. so shall his base be the distance IK. which set from I to K. and then proceed in all points as before, and finde the point P. then draw the line P E Q. so shall you cut off the figure PDCQ. equall to the square, whose side is the line X. which was required. 37. 1. 12. 6. 47. 1. 31. 6.

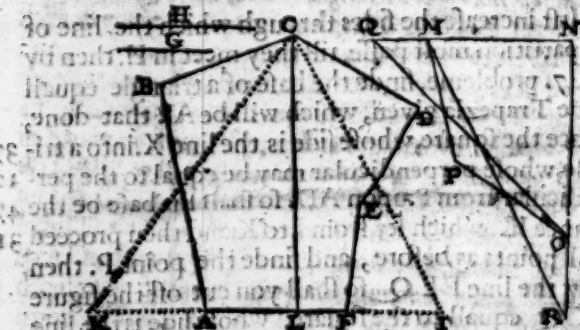
And in the same manner, may be cut off a number of Acres, with a line drawn through the point E. For make any figure to contain so many Acres as the square, whose side is the line X. containeth, then cut off CDPQ. equall thereunto as already taught, so shall you cut off, so many Acres with a line drawn through a given point within, as was required.

Prob.

Prob. CXIX

To devide a plot given, according to any proportion assigned, with a line drawne from an angle appointed and to lay the part required, toward a place assigned.

Let ABCDEF. be a plot given, to be devided into two parts, (as G. to H.) with a line drawn from the angle C. and to lay the lesser part next A.



FIrst consider on what side the line drawn from C. must fall, which will be the side AF. which draw forth both waies at length to I and to K. then by the 47. probleme, or by the latter part of the 48. reduce the plot into a triangle, with two lines drawne from the angle C. or only finde the
37.1. points I. and K. (which is better) so shall IK. be the
10.6. base of a triangle equall to the whole plot, whose perpendicular is the shortest distance from C. upon

that

that baſe. That done, devide IK. in L. as G. to H. ſo that as G to H, ſo IL. to LK. (and becauſe the leſſer part is to be laid next F.) therefore having devided the baſe IK, according to the lines GH. (ſet the leſſer part from I. to L. els muſt it have been ſet from K. towards I. Laſtly, draw the line CL. ſo ſhall you devide the plot into two parts with a line drawne from the angle C. in proportion one to the other, as G. to H. which was required.

PROB. CXX.

To cut off from a plot, with a line drawn from an angle aſſigned, a part equall to a figure given, and to lay the part cut off towards a place appointed.

Let in the laſt Diagram MNOP. be a figure given, to be cut off from the plot ABCDEF. with a line drawn from the angle C. and to lay the part cut off next F.

HEre you muſt likewiſe conſider, to what ſide the line of partition CL. muſt be drawn, for that is alwayes to be firſt increaſed that way, as the figure cut off is to be laid, and in this caſe, there is no need to finde ŷ baſe of a triangle equal to the whole plot as before: But it may ſuffice by the 48. probleme to draw the line CI. on that ſide as the plot is to be laid) or onely to finde the point I. and not the point K. at all. That done, reduce your figure MNOP. given to be cut off, into ſuch a triangle, whoſe perpendicular may be equall to the perpendicular from C. (in ŷ plot) to the baſe AF. as firſt into the triangle 37.1 1.6

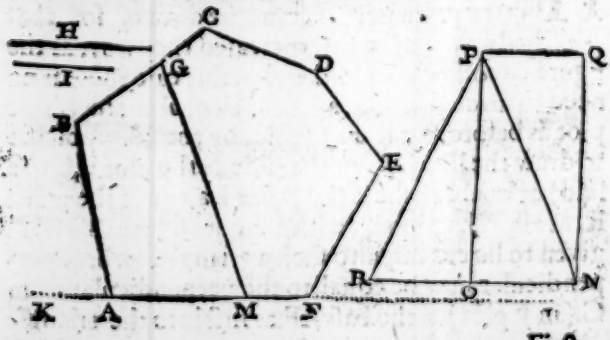
QNO. then that into the triangle MNR. whose perpendicular NR. may be equall to the perpendicular from C. on IK. the base of the plot, so shall your figure MNOP. be at lastbrought into the triangle MNOR. whose base is NM. which take and set in the plot from I. to L. (because it is required to lay the part cut off next F.) Lastly, draw from C. to L. the line GL. so shal you cut off the figure CDEFL
37.1 equall to MNOP. your figure given, with a line
1.6 drawn from the angle C. as was required.

And in the same manner may you cut off a number of Acres, Roods, Poles, &c. and lay them towards a place appointed.

PROB. CXXI.

To devide a plot according to any proportion given, with a line drawn from a point assigned in any of the sides, and to lay the part required towards a place appointed.

Let ABCDEF. be a plot given, and let G. be a point assigned in the side BC. from whence a line is to be drawn to devide the plot into two parts in proportion one to the other, as the line H. to the line I. and to lay the bigger part next F.



First,

First, consider to what side the line of partition G M must be drawn, which will appear to be the side AF. which increase both wayes to K. and to L. That done, by the latter part of the 48. probleme, finde K L. for the base of a triangle, equall to the whole plot, whose perpendicular is the shortest distance from the point G. on that base, then devide that base in M. as the line H. to the line I. (& because the bigger part is to be laid next F. therefore set the bigger part of the base (being so devided) from L. towards K. endeth in M. Lastly, from the assigned point G. draw to M. the line G M. so shall you devide the plot into two parts in proportion one to the other, as the line H. to the line I. with a line drawn from the point G. and lay the bigger part next F. which was required. 37.1 10.6

PROB. CXXII.

To cut off from a plot given, with a line drawn from a point in one of his sides, a part equall to a figure given, and to lay the part cut off towards a place appointed.

Let in the last Diagram A B C D E F. be a plot, and N O P Q. be a figure given, and it is required from the plot, to cut off so much as the figure N O P Q. with a line drawn from the point G. and to lay the part cut off next A.

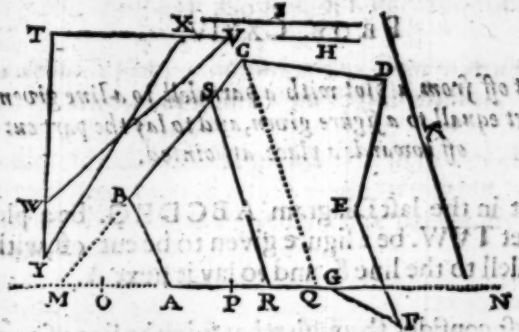
HEre is no need to finde the baſe of a triangle equall to the whole plot as before, but it may ſuffice to lengthen the ſide FA. and to finde the point K. by the 48. probleme, which is one end of the baſe of a triangle equal to the whole plot, whoſe perpendicular is the ſhorteſt diſtance from G. upon that baſe, (and here note, that the baſe FA. muſt be increaſed that way as the part cut off is to be laid, viz towards A.) That done, reduce your figure given
37.1. NOPQ. to be cut off into ſuch a triangle, whoſe
1.6. perpendicular may be equal to a perpendicular from the given point G. upon the baſe (of the plot) AF. as into the triangle NPR. whoſe baſe is NR. which take and ſet from K. to M. Laſtly, from the point G. to M. draw the line GM. which ſhall cut off the part ABGM. next A. equall to the given figure NOPQ. with a line drawn from the point G. as was required.

PROB. CXXIII.

To devide a plot according to any proportion aſſigned, between two ſides, with a parralell to a line given, and to lay the part required towards a place appointed.

Let ABCDEFG. be a plot given, to be devided into two parts, in proportion one to the other, as the line H. to the line I. with a parralel to the line K. and to lay the leſſer part next A.

First,



FIrſt conſider through which ſides the line of partition RS. ſhall paſſe, which will be the ſides GA. and CB. which increaſe till they meet in M. alſo draw forth the ſide or baſe AG. to N. then by the latter part of the 48. probleme, finde the whole baſe of a triangle equall to the plot, which will be ON. whoſe perpendicular ſhall be the ſhorteſt diſtance from C. to the baſe. Then devide that baſe ON. in P. as H. to I. and ſet the leſſer part from O. to P. next A. (becauſe it is ſo required) Then by C. draw a parralell to the given line K. to cut the baſe ON. in Q. as the pricked line CQ. That done, between MP. and MQ. finde a mean proportion, as MR. Laſtly, by the point R. draw a parralell to the line K. as RS. ſo ſhall you devide the given plot into two parts, as H. to I. and alſo lay the leſſer part next A. with a parralell to the line K. as was required.

37. 1.
10. 6.
1. 6
13. 6.

PROB. CXXIV.

To cut off from a plot with a parralell to a line given, a part equall to a figure given, and to lay the part cut off towards a place appointed.

Let in the last Diagram ABCDFG. be a plot, and let TVW. be a figure given to be cut off, with a parralell to the line K. and to lay it next A.

FIrst consider, through what sides the line of partition must passe which are GA. and CB. which increase till they meet in M. then by the 48. probleme, finde the base of a triangle equall to the whole plot, as ON. whose perpendicular is the shortest distance from C. upon that base, That done, reduce your figure given to be cut off, viz. TVW. into a triangle, whose perpendicular may be equal to a perpendicular from C. upon the base ON. as into the triangle TXY. whose base is TX. which take and set from O. to P. Then by C. draw a parralell to the line K. as the pricked line CQ. to cut the base ON. in Q. That done, finde a meane proportion betweene MQ. and MP. as MR. Lastly, by the point R. draw a parralell to the given line K. as RS. so shall you cut off the part BARS. equall to TVW. the figure given, and lay it next A. with a parralell to the line K. as was required.

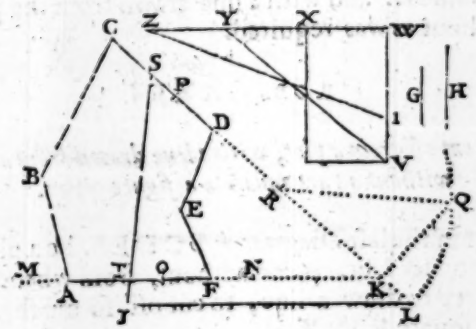
37.1
1.6
Cor. 19.6.

PROB. CXXV.

PROB. CXXV.

To devide a plot, according to any proportion assigned, with a line drawn from a point without.

Let ABCDEF. be a plot given, to be devided into two parts in proportion one to the other, as the line G. to the line H. with a line drawn from the point I.



FIrst, consider through which sides the line drawn from the point I. must passe, which will appear to be AF. and CD. therefore, increase them till they meet in K. and draw forth CD. at length to L. then by the point I. draw a parralell to AK. as IL. to meet with CD. being drawn forth in L. That done, finde by the 48. probleme, the points MN. so is the line MN. the base of a triangle equal to the whol plot, whose perpendicular is the shortest distance from C. upon that base, which base MN. devide by the

24. pro-

37. 1. 10. 6 13. 6. 47. 1. 16. 6. 24. probleme, in O. as G. to H, *viz.* that as G. to H. so N O. to O M. then say by the 23. probleme, if L I give K O. what K C? answer K P. that done, between L K. and K P. finde a mean proportion, as K Q. then devide alwaies, K P. into two equall parts in R. and draw the line R Q. which set from R. to S. Lastly, from the point I. to S. draw the line I T S. so shall you devide the plot given, A B C D E F. into two parts, *viz.* S D E F T. the lesser, and S C B A T. the bigger, in proportion one to the other as the line G. to the line H. and with a line drawn from the point I. without as was required.

Prob. CXXVI.

To cut off from a plot, with a line drawn from a point without a part equall to a figure given.

Let in the last Diagram A B C D E F. be a plot given, and let I. be a point without, from whence it is required to draw a line, to cut off so much as the long square V W X.

First as before, consider through which sides the line of partition shall passe, which are A F. and C D. the which increase till they meet in K. then find the point N. by the 4th. probleme (for it needeth not to find the point M. and so to get the whole base of a triangle equall to your plot) That done, reduce your figure given to be cut off, *viz.* V X. into the triangle V W Y. and again, that triangle into the triangle Z W 1. whose perpendicular Z W. may be equall to a perpendicular from C. upon the base A F.

37. 1 13. 6 47. 1. 16. 6

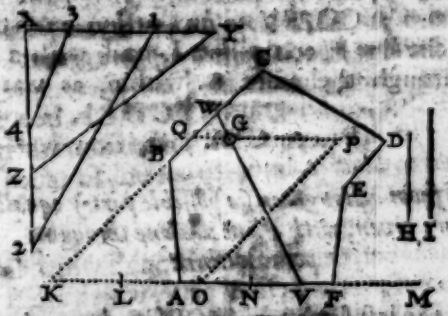
of

of your plot given, then is the base of that triangle W 4. which take and set from N. to O. then according to the last probleme, finde the point S. and draw the line ST. which shall cut off the figure SDEFT. equall to VWX. the long square given, which was required.

Prob. CXXVII.

To devide a plot into two parts, (according to any possible proportion given) with a line drawne through a point within.

Let ABCDEF. be a plot given, and let G. be a point within, & it is required to draw a line through that point to devide the plot into two parts in proportion, as the line H. to the line I.



First consider through which sides the line of partition shall passe, which will easily appeare to be the sides CB. and FA. the which increase till they meet in K. then by the 48. probleme, finde LM. the base of a triangle equall to the whole plot, (whose perpendicular is the shortest distance from C. upon that base,) which base LM devide by the 24. probleme

bleme, in N. as H. to I. ſo that as H. to I. LN. may be to NM, That done, from the point G. within, let fall a perpendicular to the baſe LM. or take the ſhorteſt diſtance to it, and then ſay by the 23. probleme, if
37. 1. that perpendicular or ſhorteſt diſtance, give the per-
10. 6. pendicular from C. upon the baſe LM. what the ½ of
12. 6. KN? anſwer KO. which ſet from K. to O. then by O.
47. 1. draw a parralell to KC. as QP. and by the point G.
31. 6. draw alſo a parralell to the baſe LM. as QGP. to meet with the other parralel in P. That done, take by the 55. probleme, the ſquare of QG. from the ſquare of GP. reſt is the right angled triangle 3X4. the line X4. for the ſide of a ſquare remaining, which take and ſet from O. to V. Laſtly, draw the line VGW. which ſhall devide the plot into two parts viz. WBAV. and WCDEFV. in proportion one to the other, as the line H. to the line I. and with a line drawn through the point G. within, as was required.

Prob. CXXVIII.

To cut off from a plot given (a poſſible part) equall to a figure given, with a line drawne through a point within.

Let in the laſt Diagram ABCDEF. be a plot given, and let it be required to cut from it ſo much as the triangle YXZ. with a line drawn through the point G. within.

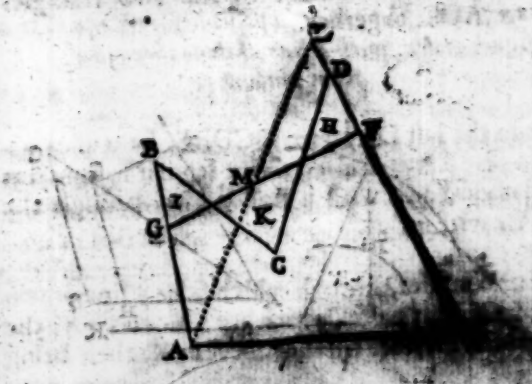
FIrſt conſider, through which ſides the line drawn by G. muſt paſſe, which are CB. and FA. the which increaſe till they meet in K. then bring

your

your triangle YXZ. to be cut off, into the triangle aXo. whose perpendicular Xo. may be equall to a perpendicular from C. (in your plot) to the base LM so shall Xl. be the base of that triangle, which take, and set from L. to N. then say as before, if the perpendicular or shortest distance, from G. upon LM. give the perpendicular or shortest distance from C. upon the same base LM. what the ½ of KN? answer KO. then by O. drawe a patralell to KC. and so finish it in all points, as in the last probleme, and draw the line VCW. so shall you cut off the figure WBAV. equall to YXZ. the triangle given, with a line drawn through the point G. within, as was required.

Prob. CXXIX.

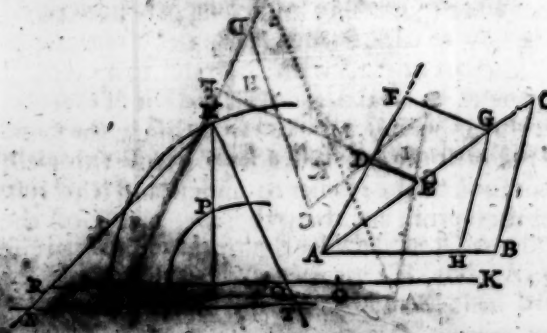
There is a plot as ABCDE. and in the side DE. is a point as F. from the which it is required to draw a line as FG. to cut off the two triangles H. and I. and to take in the triangle K. equall to them both, so that the Trapezia AGFE. may be equall to the given plot ABCDE. &c.



First, bring the plot into the triangle AEL. equall thereunto, and then by the 39. probleme counting EL. LA. and AB. (the three lines, and F the point given) cut off the triangle ELM. and take in the triangle AGM. equall thereunto, by drawing the line FG. according as in the said 39. probleme is taught, so shall you get the Trapezia AGFE. equall to the plot given, ABCDE. and then of necessitie must the triangle K. taken in, be equall to both the triangles H. and I. cut off together, which was required. 37. I.

Prob. CXXX.

There is a peece of ground, as ABC. and adjoyning to it another part as ADE. whose sides AD. runneth forth by F. now it is required, to finde a point in the side AC. as G. from whence a parralell drawn to CB. as GH. and another to ED. as GF. in such sort, that the part GCBH. cut off, may be equall to the part FGED. taken in, so that the whole Trapezia AFGH may be equall to the two triangles ABC. and ADE. together.



First

First between AC. and his perpendicular from E. finde a meane proportion which will be IM. also betweene AE. and his perpendicular from D. finde another meane which will be IR. then by the 54. probleme, adde their squares together, so shall the line MQ be the side of a square equall to them both, that done by the 52. probleme, devide the side AC. in power as AE. to his perpendicular from D. so that as the perpendicular from D. upon his base AE. to AE. so the lesser part of the power of AC. to the power of AC. being so devided, which lesser part in power is the line IR. whose square as to the square of IM. so shall MR, be the side of a square equall to them both, that done, say by the 23. probleme, if MR give MQ. what AC. which is MS? answer MT. which take and set from A. to G. upon the side AC. Lastly, by G. draw a parralell to CB. as GH. Also, a parralell to ED, as GF. so shall you cut off the Trapezia GCBH. and take in the Trapezia FGBD. equall thereunto, so that the whole Trapezia AFGH. shall be equall to both the triangles ABC. and ADE. together, which was required.

From whence a further knowledg may be derived, that is, how to cut off from a triangle [Trapezia] or plot] any part or parts with a parralel to a crooked line, as with a parralell to FGH. &c. but of that and other things hereafter, if God spare life, in the mena time I request the gentle Reader to peruse this well, so shalt thou be the readier to understand the rest, and if thou profit any thing thereby, give God the

praise and lend me thy good word, so shall I think my paines herein well bestowed, wishing thee, mee, and all, the perfection of knowledge, which it to know God in Jesus Christ, and so I commit thee and us all to his mercifull protection.

FINIS.